RECORD OF DECISION

COOPER DRUM COMPANY
CITY OF SOUTH GATE, CALIFORNIA

U.S. Environmental Protection Agency
Region 9
San Francisco, California

September 27, 2002

RECORD OF DECISION
COOPER DRUM COMPANY

Part I - DECLARATION

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PART I THE DECLARATION

1.1 Site Name and Location

Cooper Drum Company
9316 Atlantic Avenue
City of South Gate, Los Angeles County, California 90280
CERCLIS Identification Number CAD055753370.

1.2 Statement of Basis and Purpose

This decision document presents the selected remedy for the Cooper Drum Company Superfund Site (Cooper Drum), in South Gate, California, which was chosen in accordance with Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended by Superfund Amendments and Reauthorization Act of 1986 (SARA) (collectively referred to herein as CERCLA) and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan, (NCP). This decision is based on the Administrative Record file for Cooper Drum.

The State of California, acting through the California Department of Toxic Substances Control (DTSC) and the Los Angeles Regional Water Quality Control Board (LARWQCB), concur with the selected remedy.

1.3 Assessment of Site

The response action selected in this Record of Decision (ROD) is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances, pollutants or contaminants from the Cooper Drum site which may present an imminent and substantial endangerment to public health or welfare.

1.4 Description of Selected Remedy

The remedial action for Cooper Drum addresses contaminated soil and groundwater. To remove the potential threat to human health, the selected remedy will use dual phase extraction (DPE) for treatment of volatile organic compounds (VOCs) in soil and perched groundwater. Other non-VOC soil contaminants, including semi-volatile organic compounds (SVOCs), PCBs, and lead, will be excavated and disposed of off site. Institutional controls will be implemented to prevent exposure to soil contaminants where excavation is not feasible. The cleanup strategy for groundwater contaminated with VOCs will use a combination of methods to achieve remedial goals and to restore the potential beneficial use of the aquifer as a drinking water source. An extraction/treatment system will be used for containment and remediation. Chemical in situ treatment will also be used to enhance the treatment of VOCs in groundwater, minimize the need for extraction, and reduce the potential for other VOC plumes in the vicinity to impact Cooper Drum.

There is no source material or non-aqueous phase liquids (NAPLs) in the groundwater constituting a principal threat at Cooper Drum. The VOCs in the soil are mobile but are low-level threats to human health since they contain relatively low contaminant concentrations and can be contained. The non-VOCs in the shallow soil are not mobile and are localized in a confined area.

The major components of the selected remedy includes the following actions:

<u>Selected Remedy for Soil</u>

- In the former hard wash area (HWA), extract VOC-contaminated soil vapor and groundwater simultaneously using dual phase extraction (DPE) technology. Treat the extracted soil vapor and groundwater using vapor and liquid phase carbon in vessels at an on-site treatment plant.

- After removal of VOCs, discharge the treated soil vapor into the air. The treated water will be reinjected into the aquifer or discharged to the public sewer system operated by the Los Angeles County Sanitation District.

- Conduct additional soil gas sampling in the drum processing area (DPA) during the remedial design (RD) phase to further identify the extent of VOC contamination and the need for remediation using dual phase extraction in this area.

- In the HWA and DPA, excavate an estimated 2,700 tons of non-VOC contaminated shallow soil (estimated down to five feet in depth) for disposal at an approved off-site facility. Use clean soil to backfill excavated areas.

- Conduct additional soil sampling in the DPA and HWA during the RD phase to further define the extent of non-VOC contamination and the need for remediation beyond the estimated 2,700 tons of soil.

- Implement institutional controls for soil contaminated with non-VOCs in areas where excavation is not feasible, such as under existing structures, by requiring the execution and recording of a restrictive covenant which will limit activities that might expose the subsurface and would prevent future use, including residential, hospital, day care center and school uses, as long as contaminated soil remains on site.

<u>Selected Remedy for Groundwater</u>

- Extract groundwater contaminated with VOCs and treat it using liquid-phase activated carbon in vessels at an on-site treatment system. Containment will be provided at the downgradient extent of contamination.

- The treated water will be reinjected into the contaminated groundwater aquifer or discharged to the public sewer system operated by the Los Angeles County Sanitation District. Reinjection will reduce the intrusion of and the potential for mixing with other off-site VOC plumes.

- Use in situ chemical treatment, either reductive dechlorination or chemical oxidation, to enhance remediation of VOC-contaminated groundwater. During the remedial design (RD) phase, conduct treatability studies to evaluate both methods and determine which works best under site conditions. Data obtained from pilot studies will also be used to determine the specific number and placement of in situ injection points.

- Conduct additional groundwater sampling during the RD phase to further define the downgradient extent of the VOC contamination.

- Conduct groundwater monitoring to evaluate the effectiveness of the remedy, the location of the plume, and that remediation goals have been met.

1.5 Statutory Determination

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

This remedy also satisfies the statutory preference for treatment as a principal element of the remedy (i.e., reduces the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants as a principal element through treatment).

Because this remedy may result in hazardous substances, pollutants, or contaminants in soil remaining on site above levels that allow for unlimited use and unrestricted exposure, and will take longer than five years to attain RAOs and cleanup levels, a review will be conducted within five years after initiation of the remedial action for Cooper Drum to ensure that the remedy is, or will be, protective of human health and the environment.

1.6 ROD Data Certification Checklist

The following information is included in the Decision Summary section of this Record of Decision. Additional information can be found in the Administrative Record file for Cooper Drum.

- Chemicals of concern and their respective concentrations - Page 15;

- Baseline risk represented by the chemicals of concern - Page 21;

- Cleanup levels established for chemicals of concern and the basis for these levels - Page 74;

- Conclusion that there are no source materials constituting principal threats at the site - Page 63;

- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the baseline risk assessment and ROD - Page 19;

- Potential land and groundwater use that will be available at the site as a result of the selected remedy - Page 73;

- Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected - Page 69; and

- Key factor(s) that led to selecting the remedy - Page 64.

1.7 Authorizing Signature

John Kemmerer, Chief
Superfund Site Cleanup Branch
U.S. Environmental Protection Agency, Region 9

9/27/02

Date

PART II THE DECISION SUMMARY

1.0 Site Name, Location, and Description

The Cooper Drum Company Superfund Site (Cooper Drum) is located at 9316 South Atlantic Avenue in South Gate, Los Angeles County, California (CERCLIS Identification Number CAD055753370). It is 10 miles south of the city of Los Angeles and approximately 1,600 feet west of the Los Angeles River (Figure 1-1). The property consists of 3.8 acres and is located in an urban area of mixed residential, commercial, and industrial uses. Cooper Drum is zoned for heavy industrial land use and has been used to recondition and recycle steel drums. Facilities include processing areas for cleaning and painting drums, storage areas, an office, a warehouse, and maintenance buildings. All buildings have concrete floors, and the entire facility was paved with asphalt in 1986.

The lead agency for Cooper Drum is the U.S. Environmental Protection Agency (EPA). The California Department of Toxic Substances Control (DTSC) and Los Angeles Regional Water Quality Control Board (RWQCB) serve as support agencies. Currently, the expected source of cleanup monies is the Superfund trust fund since the Cooper Drum Company filed for bankruptcy in 1993, and no other potentially responsible parties have been identified.

2.0 Site History and Enforcement Activities

2.1 Site History

Since 1941, Cooper Drum has been used by several companies to recondition and recycle used steel drums that once contained a variety of industrial chemicals. The Cooper Drum Company operated from 1972 to 1992, reconditioning drums with a process that consisted of flushing and stripping the drums for painting and resale. Drum process waste was collected in open concrete sumps and trenches that resulted in releases to soil and groundwater beneath the site.

A history of the site's use for reconditioning and recycling steel drums containing residual chemicals, includes the following:

- Since 1941, the northern portion of Cooper Drum has been owned and operated by drum recycling companies (the use and ownership of the southern portion of the site prior to 1971 is unknown). The Cooper Drum Company purchased both parcels and operated the facility from 1972 until 1992.

- Reconditioning activities took place within the present-day drum processing area (DPA) (see Figure 1-2) which is located in the central portion of Cooper Drum. When necessary, heavy duty cleaning called "hard washing" was performed in the northeast portion of the site [the former hard wash area (HWA)-see Figure 1-2]. Caustic fluids, generated by reconditioning and hard washing activities, and waste materials, removed from inside the drums, were collected in open concrete sumps and trenches. This led to the contamination of the soil and groundwater beneath Cooper Drum. Recent investigations have shown that most contamination at Cooper Drum can be traced to the HWA and the DPA.

- Beginning in 1987, the Cooper Drum facilities were retrofitted to provide better environmental protection. Closed-top steel tanks were installed over the sumps, and the trenches have been replaced with hard piping. The former hard wash area was closed and replaced with a new hard wash area in the DPA which also provided hard piping and secondary containment.

- The Cooper Drum Company continued to operate the facility until 1992. In 1992, the drum reconditioning business was sold to Waymire Drum Co., which operated the facility until 1996.

- Since 1996, Consolidated Drum Co. has been the drum reconditioning operator at the site. The facility has been fitted to also process plastic totes (large square containers). Consolidated Drum continues to use an above-ground enclosed system for containing liquids and wastes.

2.2 Previous Investigations and Enforcement Activities

Beginning in 1984 through 1989, several incidents involving the release of hazardous substances at the site resulted in Notice of Violations being issued to the Cooper Drum Company by the Los Angeles Department of Health Services (LADHS). The LADHS required the Cooper Drum Company to conduct investigations of soil and groundwater. In 1989, the California Department of Health Services, now known as the Department of Toxic Substances Control (DTSC), also collected soil samples from under the DPA. The studies identified the following hazardous substances in soils at or near Cooper Drum:

- Tetrachloroethylene (PCE, a cleaning solvent)
- Trichloroethylene (TCE, a cleaning solvent)
- Dichloroethylene (DCE, a by-product of TCE)
- Petroleum hydrocarbons
- Polychlorinated biphenyls (PCBs)
- Polyaromatic hydrocarbons (PAHs)
- Metals

Under the direction of the LADHS, consultants for the Cooper Drum Company excavated and removed contaminated soil from their property and from the adjacent Tweedy Elementary School, after caustic fluids leaked from trenches under the drum processing building onto school property. To assess impacts to groundwater in the uppermost aquifer beneath Cooper Drum (approximately 40 to 80 feet below ground surface), four monitoring wells were installed on site and one upgradient well off site.

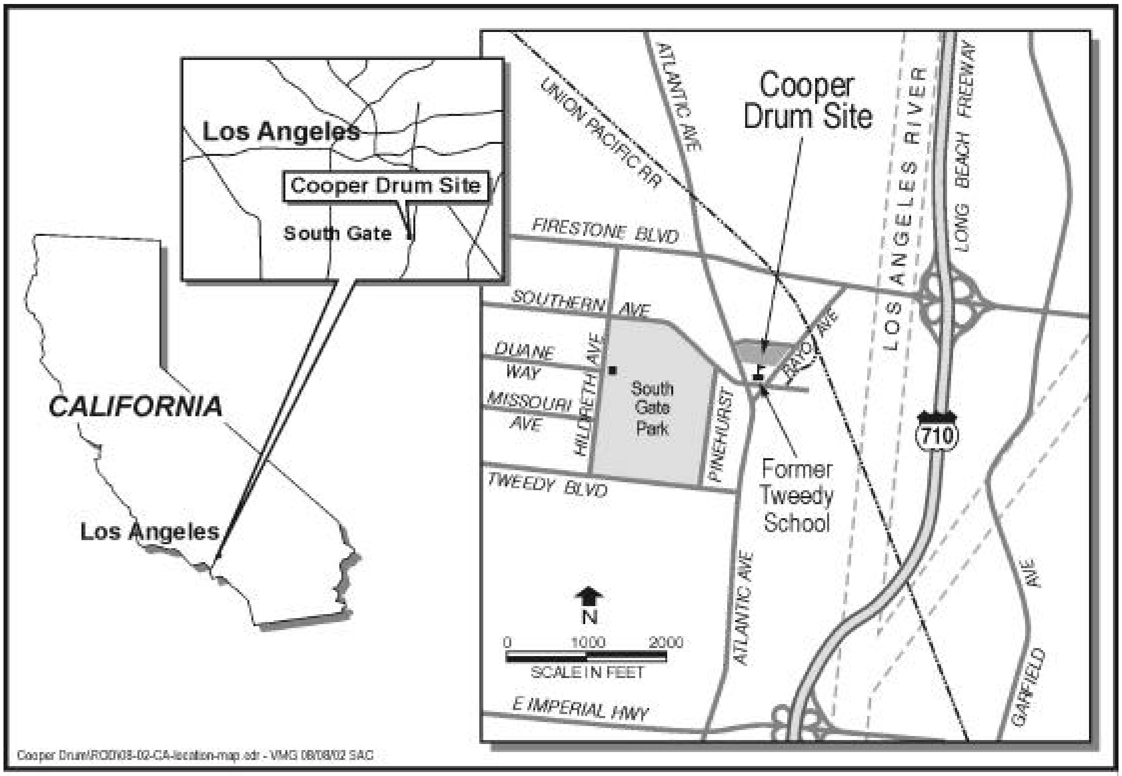

Figure 1-1. Site Location Map

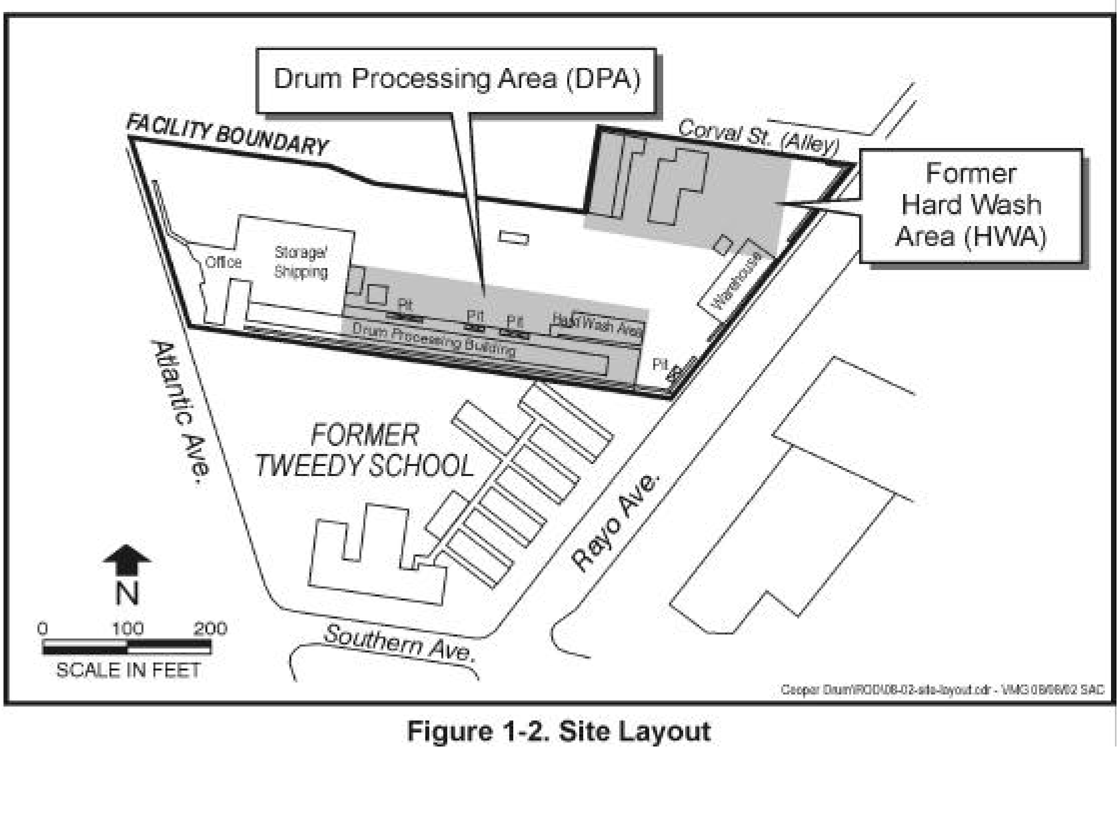

Figure 1-2. Site Layout

The groundwater beneath Cooper Drum was identified as contaminated with VOCs. In 1987, the City of South Gate closed four municipal water supply wells found to contain PCE. These wells are located in South Gate Park within 1,500 feet southwest of the site. At that time, the City listed Cooper Drum as a possible source of the PCE contamination, however, recent investigations indicate that groundwater contamination found beneath the site did not contribute to the deeper groundwater contamination affecting these municipal wells. The groundwater contamination originating from Cooper Drum is moving to the south and not toward the municipal wells. It is also confined to the upper aquifer and is not currently affecting any drinking water supplies in the City of South Gate because the municipal wells are completed in deeper aquifers.

The Tweedy School, located on the adjacent property, was closed in 1988 due to the concern that children attending the school could be exposed to contamination migrating from Cooper Drum and from other industrial operations in the area.

Based on the discovery of the soil and groundwater contamination described above, EPA first proposed Cooper Drum for inclusion on the National Priorities List (NPL) in 1992. EPA issued General Notice and 104(e) letters to Cooper Drum owners and operators at that time. During 1993, EPA met with Arthur Cooper, the site owner (and previous operator before Waymire Drum Co. took over operations in 1992) who was considered a potentially responsible party (PRP). The purpose of the meeting was to discuss the special notice letter EPA was planning to send to him and to begin negotiations for an Administrative Order on Consent (AOC) to conduct the Remedial Investigation. Later that same year, the Cooper estate declared bankruptcy upon the death of Mr. Cooper. Due to the lack of assets, the Cooper estate was no longer considered a viable PRP to help pay for Cooper Drum investigation and remediation. Consequently, Cooper Drum became a fund-lead site where Superfund trust fund money is used for site activities. Based on additional site investigation data collected by EPA, Cooper Drum was re-proposed for the NPL in January 2001. In June 2001, the EPA added Cooper Drum to the NPL of hazardous waste sites requiring remedial action.

EPA conducted the Remedial Investigation (RI) activities for Cooper Drum during 1996 to 2001. EPA initiated a soil gas survey in 1996 to identify potential hot spots (areas where contaminant concentrations of VOCs are the highest) for a Phase 1 RI. This investigation identified hot spots in the vicinity of the former HWA in the northeastern portion of the property and in the DPA in the central portion of the property. The Phase 1 RI was designed to further investigate the potential presence of VOCs, semi-volatile organic compounds (SVOCs) and metals in soil and groundwater beneath Cooper Drum and the adjacent Tweedy School property. Based on the results of the Phase 1 RI, EPA expanded its investigation of soil and groundwater to delineate the extent of contamination as part of a Phase 2 RI conducted between September 1998 and March 2001. The complete RI report was released in May 2002, and is discussed further in Section 5.0.

Nearby properties, which have also undergone investigation as sources of groundwater contamination under the direction of the LARWQCB, include the Jervis Webb site (north of Cooper Drum) and two former Dial Corporation sites (northeast and east of Cooper Drum). Data from investigations at these three sites have determined that groundwater flows in a southerly direction. High concentrations of TCE in the shallow aquifer have been detected under the Jervis Webb site (33,000 parts per billion) and in a downgradient monitoring well (6,700 parts per billion), which is located 200 feet upgradient and northeast of Cooper Drum. Due to its proximity, the groundwater contamination from Jervis Webb may already have commingled and impacted the Cooper Drum plume. The need to reduce the potential for commingling of these two plumes was an important factor considered during remedy selection.

3.0 Community Participation

During March and April 2001, EPA interviewed concerned residents, agency representatives, elected officials, and a community- based environmental justice organization. Based on these interviews, EPA prepared The Cooper Drum Community Involvement Plan which was issued in March 2002.

In May 2002, the RI/FS Report and Proposed Plan for Cooper Drum were made available to the public. These documents can be found in the Administrative Record file at the EPA Region 9 Record Center located at 95 Hawthorne Street in San Francisco and at the information repository located at the Leland R. Weaver Library at 4035 Tweedy Boulevard in South Gate, California. A Public Notice was published June 11, 2002 in the *Long Beach Press Telegram* to notify community members about the availability of the RI/FS and Proposed Plan. The Proposed Plan was also mailed to the community. The Public Notice announced the date and location for the public meeting and identified the public comment period (June 11 through July 10, 2002) for the Proposed Plan. In addition, flyers announcing the meeting were hand delivered to nearby residents and parents of children attending the relocated Tweedy Elementary School. All materials, including the Proposed Plan fact sheet, meeting presentation slides and handouts were prepared in both English and Spanish.

The public meeting for the Proposed Plan was held June 27, 2002. At this meeting, representatives from the City of South Gate Planning Department, DTSC, and EPA answered questions about the problems at Cooper Drum and the remedial alternatives. No significant comments or objections concerning the preferred remedial alternatives were raised at the meeting. Transcripts of the public meetings are part of the administrative file at the information repositories. EPA did not receive any written comments from the community during the public comment period for the Proposed Plan. The one written comment received from the California DTSC is addressed in the Responsiveness Summary in Part III.

4.0 Scope and Role of Operable Unit or Response Action

Cooper Drum contains two sources of contamination (i.e., HWA and DPA) and one groundwater plume that requires remedial action. The VOC soil contamination in the HWA appears to be the main source of contaminants found in the groundwater. The VOC soil contamination found in the DPA appears to have minimal contribution to the groundwater plume. Soil removals were conducted on the north side of the DPA in 1984, and along the south side of the DPA on the Tweedy School in 1987. No other removal or interim action was taken or is planned at Cooper Drum. Because of the relatively small area addressed in the selected remedy, dividing Cooper Drum into discrete portions, or operable units, for the purpose of managing a site-wide response action is not necessary.

The selected remedy will address soil and groundwater contamination for Cooper Drum. This response action involves control and treatment of VOC contaminants in the groundwater plume migrating from under the HWA, treatment of VOC soil contaminants in the HWA (and potentially from the DPA), and removal of the non-VOC soil contaminants at the HWA and DPA. Institutional controls will be implemented to limit exposure to any contaminated soil left on site.

5.0 Site Characteristics

5.1 Conceptual Site Model

The conceptual site model (CSM), presented on Figure 5-1, is based on the following exposure pathways: 1) Ingestion, dermal contact, and inhalation of groundwater contaminants; 2) Ingestion and direct contact with surface and subsurface soil; 3) Inhalation of airborne contaminants in outdoor air originating from soil; and 4) Inhalation of indoor air contaminants originating from soil and groundwater contamination. The receptors include future on-site and off-site residents, construction workers, and occupational workers. Assumptions applied to these pathways include: 1) pavement, concrete, buildings, and other existing cover could be removed to expose the underlying soil and 2) groundwater wells would be completed in the shallow aquifer underneath Cooper Drum and the water would be used as an untreated drinking water source. The deeper drinking water aquifers underlying Cooper Drum have not been impacted by contamination above drinking water standards; however the potential exists that contamination could migrate downward into these aquifers and adversely impact municipal water supplies. The concentration levels of soil and groundwater contaminants used in the risk assessment are based on the average (95% upper confidence limit) or the maximum concentrations detected during the RI activities. There are no ecological habitats or ecological exposures at Cooper Drum. The exposure pathways depicted in the CSM are discussed further in Section 7.1.2.

5.2 Overview of Cooper Drum

The majority of the 3.8 acre Cooper Drum property is developed for heavy industrial use, is mostly covered with asphalt or concrete, and is relatively flat with a gradual slope toward the southeast.

The property is located approximately 1,600 feet west of the Los Angeles River, which is concrete lined and flows south to southwest approximately 15 miles to the Pacific Ocean. Stormwater flows toward several drains and into the municipal stormwater system, which discharges to the Los Angeles River.

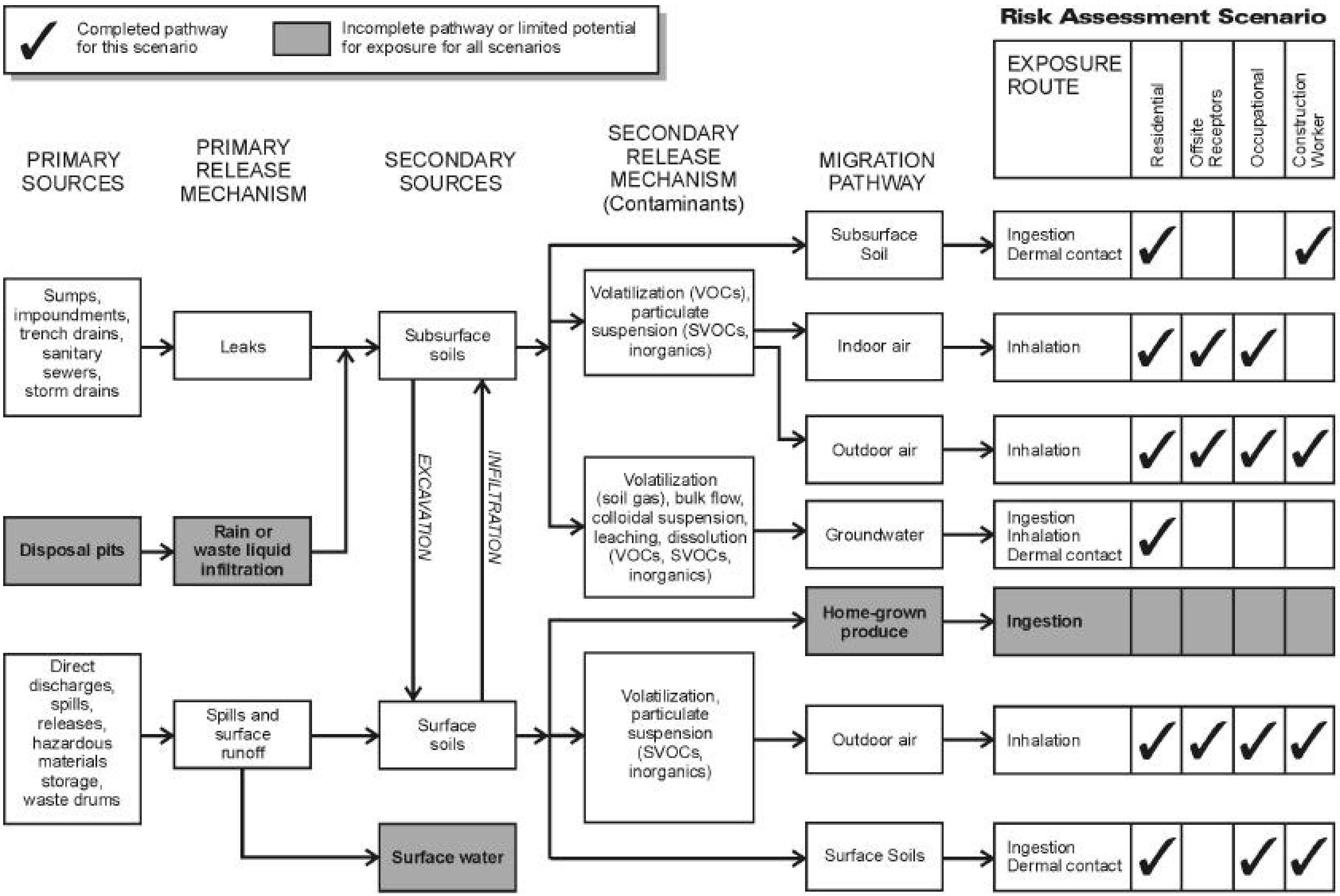

Figure 5-1. Conceptual Site Model for Cooper Drum Company Site

5.3 Surface and Subsurface Features

Open structures for recycling activities are located along the southern and northeastern property boundaries. A closed warehouse, which provides storage of equipment, is located on the eastern boundary. The majority of Cooper Drum is open and provides storage for drum and totes. A closed office building is located on the western property boundary. There are no known areas of archaeological or historical features at Cooper Drum. The subsurface aquifers beneath the site are described in section 5.7.2.

5.4 Sampling Strategy

Prior to 1996, soil sampling was performed mostly in and around the DPA with some borings located in the HWA. Four wells were installed on site (MW-1 and MW-4 in the DPA and MW-2 and MW-5 in the HWA) and one well upgradient (MW-3). All wells were completed to approximately 80 feet below ground surface (bgs) into the shallow aquifer. In 1996, EPA performed a site-wide passive soil gas survey. The VOC hot spots were subsequently investigated as part of the RI activities beginning in 1998.

The RI activities conducted in 1998 included: 1) soil sampling (down to 40 feet) and depth-discrete groundwater sampling (down to 200 feet) in borings SB-1 through SB-5; 2) sampling of the five existing on-site monitoring wells (MW-1 through MW-5); 3) soil logging and depth-discrete groundwater sampling (down to 120 feet) from four CPT borings (CPT-1 through CPT-4) located east of the site; and 4) sampling of four existing monitor wells on the ELG Metals property located east of Cooper Drum. The ELG Metals property wells are located further east of CPT-1 through CPT-4 and were sampled to confirm historical sample results and provide a data set consistent with the Phase 2 RI data to evaluate VOC distribution east of Cooper Drum.

Based on the results from the above-described field activities, additional RI activities were completed in March, April, and May 1999 including: 1) soil logging and depth discrete groundwater sampling from six CPT borings (CPT-5 through CPT-10); 2) installation and aquifer testing of one groundwater monitor/extraction well (EW-1); 3) sampling of six soil gas boring locations (SG-1 through SG-6) located in the HWA and DPA. Four of the CPT borings were located east and southeast of Cooper Drum to further delineate the extent of groundwater contamination. Well EW-1 was installed along the eastern boundary of Cooper Drum adjacent to Rayo Avenue. The well was installed to evaluate the extent of groundwater contamination along the eastern property boundary. Soil gas samples were sampled at approximately 10-foot sample intervals to 45 feet bgs to evaluate VOC vadose zone contamination in suspected source areas.

Additional RI activities were conducted between October 2000 and March 2001 and discussed below. Ten shallow borings (SB-8 to SB-17) were sampled to approximately 10 feet bgs. Five borings (SB-8 through SB-12) were located in the former HWA, and four borings (SB-13 through SB-16) were located around the drum processing building to assess VOC and non-VOC soil conditions. Eleven soil vapor borings (SG-7 to SG-17) were sampled to a depth of approximately 35 feet bgs in the vicinity of former HWA and the drum processing building to further delineate vadose contamination observed in the soil gas samples collected during the 1999 field investigations.

Fourteen cone penetrometer borings (CPT-11 through CPT-24) were logged and sampled to a minimum depth of 120 feet bgs to further delineate the extent of impacted groundwater. Six new groundwater monitoring wells (MW-15 to MW-19 and EW-2) were installed and sampled. One well was on site and five were off site. The on-site well, EW-2, was completed in the shallow aquifer to approximately 80 feet and was designed as a groundwater extraction well. The other five wells were completed along Rayo Avenue in the shallow aquifer to define the lateral extent of groundwater contamination. Two of the off-site wells, MW-16 and MW-18, were completed to a total depth of approximately 130 feet bgs in the top of the Exposition Aquifer to define the vertical extent of groundwater contamination. Groundwater samples were also collected from six existing on-site wells (MW-1, MW-2, MW-3, MW-4, MW-5, and EW-1) and four off-site wells (MW-8, MW-10, MW-12, and MW-14). An eight-hour aquifer pump test was performed on EW-2 to aid in determining remedial alternatives. One soil vapor well (SVE-1) and two sets of soil vapor monitoring points (VP-1 and VP-2) were sampled, tested, and installed in the former HWA. Performance of the soil vapor extraction test was used to evaluate remedial alternatives.

5.5 Known and Suspected Sources of Contamination

The RI investigation confirmed that waste collected in open concrete sumps and trenches resulted in releases to soil, and that migration of some of these contaminants impacted the shallow aquifer beneath Cooper Drum. The primary source area of contamination was the HWA, where drum processing operations took place until 1976 when they were moved to the DPA on the south side of the property. The DPA also became a source of contamination due to chemical spills that were documented during the 1980's. Beginning in 1987, the Cooper Drum facilities were upgraded to prevent any further release of chemical wastes and to meet environmental regulations. The former hard wash area was closed and replaced with a new hard wash area in the DPA. The location of the former HWA and DPA are shown on Figure 1-2.

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5.6 Types of Contamination and Affected Media

Operations at Cooper Drum have resulted in the discharge of contaminants to the vadose zone and the underlying groundwater. Although a variety of chemicals have been released to Cooper Drum, VOCs are the chemicals that are found in both the vadose zone and groundwater. VOCs and non-VOCs have been found in the vadose zone.

The principal chemicals of concern (COCs) identified for the groundwater pathway are 1,2,3-trichloropropane (TCP), TCE, and 1,2-dichloroethane (1,2-DCA). Eight other COCs contributing to the overall risk are vinyl chloride (VC), 1,2-dichloropropane (1,2-DCP), 1,1-dichloroethane (1,2-DCA), 1,1-DCE, cis-1,2-dichloroethene (cis-1,2-DCE), PCE, trans-1,2-dichloroethene (trans-1,2-DCE), and benzene. The groundwater plume is characterized by high levels of cis-1,2-DCE and TCE. Arsenic and metals found in groundwater at concentrations exceeding drinking water standards are considered to be naturally occurring.

The principal VOC contaminants for the soil pathway are the same 11 VOCs listed above for groundwater. The non-VOCs for the soil pathway are benzo(a)pyrene, along with PCBs (Aroclor-1260 and Aroclor-1254), lead, benzo(b)fluoranthene, dibenz(a,h)anthracene, benzo(a)anthracene, benzo(k)fluorathene, chrysene, and indeno(1,2,3-cd)pyrene. Exposure to contaminants in indoor air, by on-site or off-site workers and residents, also represents a likely exposure pathway evaluated in the risk assessment summarized in Section 7.0. This scenario assumes no pavement on the property, although currently the property is paved. Soil lead concentrations of 1,920 to 3,240 mg/kg were detected in subsurface and surface soils. The COCs for Cooper Drum are summarized in Table 5-1.

Table 5-1
Types and Characteristics of Contaminants of Concern (COCs)

Contaminant (VOCs)	Source	Medium	Maximum Concentration		Frequency of Detection		Mobility	Carcinogenic
			Soil (mg/kg)	Ground water (µg/L)	Soil (mg/kg)	Groundwater (µg/L)		
Benzene	Former HWA Activities	Soil/ Groundwater	0.02	30	10/70	23/34	High	Yes
1,1-Dichloroethane (1,1-DCA)	Breakdown product	Soil/ Groundwater	0.23	340	17/70	26/35	Very high	Yes
1,1-Dichloroethene (1,1-DCE)	Breakdown product	Soil/ Groundwater	0.014	54	6/70	23/53	High	No
1,2,3-trichloropropane	Breakdown product	Soil/ Groundwater	0.044	50	1/6	20/31	High	Yes
1,2-Dichloroethane (1,2-DCA)	Breakdown product	Soil/ Groundwater	0.039	100	3/70	32/32	Very high	Yes
1,2-Dichloropropane (1,2-DCP)	Breakdown product	Soil/ Groundwater	0.019	50	3/70	24/34	High	Yes
cis-1,2-Dichloroethene (c-1,2-DCE)	Breakdown product	Soil/ Groundwater	1.1	1,200	17/64	31/33	Very high	No
Tetrachloroethene (PCE)	Former HWA Activities	Soil/ Groundwater	8.2	57	22/70	15/36	High	Yes
trans-1,2-Dichloroethene (t-1,2-DCE)	Breakdown product	Soil/ Groundwater	0.005	46	5/70	23/32	Very high	No
Trichloroethene (TCE)	Former HWA Activities	Soil/ Groundwater	0.16	800	18/70	30/34	High	Yes
vinyl chloride	Breakdown product	Soil/ Groundwater	N/A	15	N/A	25/33	Very high	Yes

Table 5-1 Types and Characteristics of Contaminants of Concern (COCs)								
Contaminant (non-VOCs)	Source	Medium	Maximum Concentration		Frequency of Detection		Mobility	Carcinogenic
			Soil (mg/kg)	Ground water (μg/L)	Soil (mg/kg)	Groundwater (μg/L)		
Aroclor-1254	Unknown	Soil	1.4	N/A	6/14	N/A	Low	Yes
Aroclor-1260	Unknown	Soil	5.5	N/A	6/14	N/A	Low	Yes
Benzo(a)pyrene	Unknown	Soil	4.3	N/A	3/13	N/A	Low	Yes
Benzo(b)fluoranthene	Unknown	Soil	6.6	N/A	3/13	N/A	Low	Yes
Benzo(k)fluoranthene	Unknown	Soil	4.6	N/A	3/13	N/A	Low	Yes
Chrysene	Unknown	Soil	4.7	N/A	4/47	N/A	Low	Yes
Dibenz(a,h)anthracene	Unknown	Soil	1.1	N/A	3/13	N/A	Low	Yes
Indeno(1,2,3-cd)pyrene	Unknown	Soil	2.1	N/A	4/13	N/A	Low	Yes
Lead	Former HWA Activities	Soil	3,240	N/A	11/12	N/A	Low	No

5.7 Location of Contamination and Potential Routes of Migration

5.7.1 Soil Contamination

Eleven VOCs were identified as COCs in soil with the potential for vertical migration to the aquifer underlying Cooper Drum. Investigations have shown that most contamination at Cooper Drum originated from the HWA and the DPA. The HWA is contaminated with soil gas concentrations in excess of 1,000 parts per billion by volume (ppbv) and extends approximately 200 feet north to south and 150 feet east to west. The DPA area of soil contamination is shallower and not as laterally extensive. There are data gaps with respect to the lateral and vertical extents of VOCs beneath the drum processing building. Further delineation of contaminants beneath the DPA will be performed as part of the remedial design.

Ten non-VOCs, including polycyclic aromatic hydrocarbons (PAHs), PCBs, and lead were identified as COCs in soil. These contaminants, found in shallow soil samples beneath the DPA and HWA, are not migrating off site or to other media. The lateral and vertical extents of non-VOCs in the HWA and DPA will require further delineation during the remedial design. Based on existing data, the total volume of soil contaminated with non-VOCs has been estimated to be approximately 2,300 cubic yards. Several metals and arsenic were investigated and considered to be naturally occurring, based on statistical testing and comparison to background studies in available literature.

5.7.2 Groundwater Contamination

One of the affected media at Cooper Drum is groundwater in the shallow aquifer. The groundwater plume from Cooper Drum is estimated to be 800 feet long and 250 feet wide and extends approximately 400 feet southeast of the Cooper Drum boundary (see Figure 5-2). Investigations have not detected DNAPLs in soil or groundwater at Cooper Drum. The groundwater flow direction beneath the former HWA in the northeast portion of Cooper Drum (i.e., the source area of contamination) is to the southeast. East of Cooper Drum along Rayo Avenue, the groundwater flow direction is southerly.

The estimated lateral and vertical extent of VOCs (based on TCE concentrations) in the shallow aquifer at Cooper Drum is presented in Figure 5-2. A generalized geologic cross section showing the water- bearing units and vertical extent of groundwater contamination is also shown on Figure 5-2. Shallow groundwater beneath Cooper Drum occurs within or is controlled by an area of lower permeability, the near surface Bellflower Aquiclude, which incorporates a perched aquifer. The perched aquifer is present in the HWA at approximately 35 feet bgs and is at least 5 feet thick. The perched aquifer has been observed to be intermittent and the lateral extent has not been confirmed. The Bellflower Aquiclude extends to a depth of approximately 70 feet bgs, where it overlies the Gaspur Aquifer, which extends to a depth of approximately 110 feet bgs. Groundwater contamination above drinking water standards has been found only down to the shallow Gaspur Aquifer. Finer-grained material (clays and silts) are present within the upper portion of the Bellflower Aquiclude and the lower portion of the Gaspur Aquifer which has minimized the vertical migration of VOCs down into the Exposition and deeper aquifers which are used for drinking water.

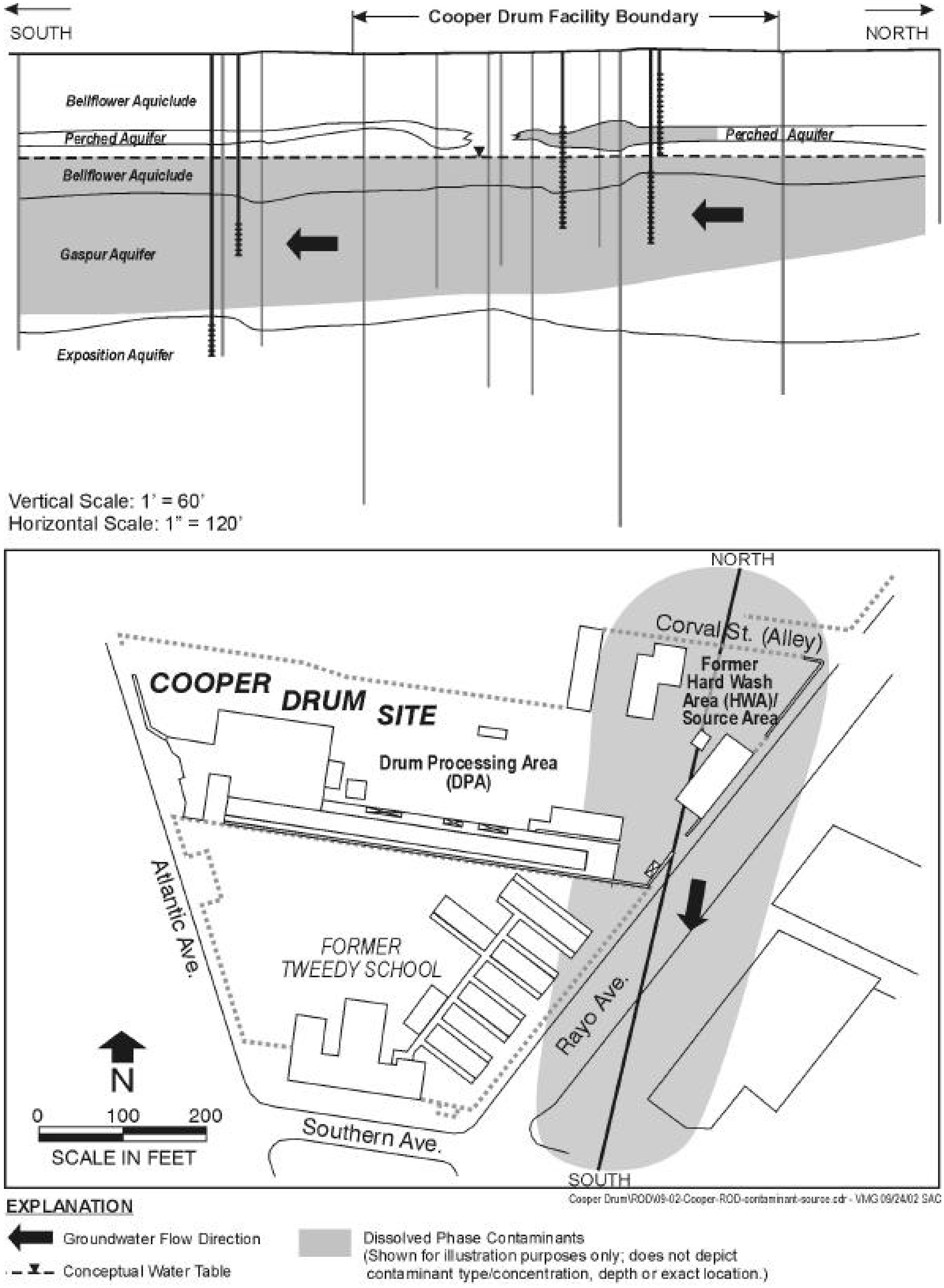

Figure 5-2. Extent of Groundwater Contamination

Municipal groundwater production wells in the vicinity of Cooper Drum draw water from the Gage Aquifer, the deepest of the Lakewood Formation aquifers at approximately 300 feet bgs, as well as from deeper aquifers within the San Pedro Formation. The Exposition Aquifer is the uppermost unit of the deeper aquifer system, and underlies the Gaspur Aquifer. The Exposition Aquifer is one of four water-bearing units within the Upper Pleistocene Lakewood Formation.

The RWQCB has identified the shallow aquifer as a potential source of drinking water and there is a potential for vertical migration of VOC into the deeper aquifer system and production wells. A generalized geological cross section of the deeper aquifer system, including production wells, is shown on Figure 5-3.

6.0 Current and Potential Future Site and Resource Uses

Cooper Drum is located in a dense urban land use setting of mixed residential, commercial, and industrial parcels. The surrounding land uses are anticipated to be of mixed urban uses in the future. The ongoing drum processing operations at Cooper Drum are considered to be a heavy industrial use for which the property is currently zoned. According to its Community Development Department, the City of South Gate is currently in the process of developing a General Plan update (the Plan) in which it is reevaluating land use designations and development options for the next 10 to 15 years within the city. The Plan is expected to be adopted by the summer of 2003. New zoning restrictions would then be enacted to conform with any changes made to land use designations in the Plan.

Future reasonably anticipated land use options for Cooper Drum include light industrial and high density commercial. Current drum processing operations could continue under a “grandfather rule” which allows for non-conforming status as long as operations are not expanded. Due to the proximity to the area where a regional high speed rail corridor may be built, it is also possible that future development for residential housing could be considered for Cooper Drum. This could occur only after the selected remedy for soil is completed and all contaminated soil above cleanup levels is removed from Cooper Drum.

The contaminated groundwater under Cooper Drum is semi-confined in the upper aquifer and characterized as shallow groundwater of poor quality water. Although the upper aquifer is not currently used as a drinking water source, it is designated by the RWQCB in the Water Quality Control Plan for the Los Angeles Region (Basin Plan) as having a potential beneficial use for drinking water. There are no other current or potential beneficial uses associated with groundwater under Cooper Drum. The potential for on-site residential land use, which includes groundwater at Cooper Drum as a drinking water source, is the most conservative scenario used as a basis for reasonable exposure assessment assumptions and risk characterization conclusions discussed in Section 7.0.

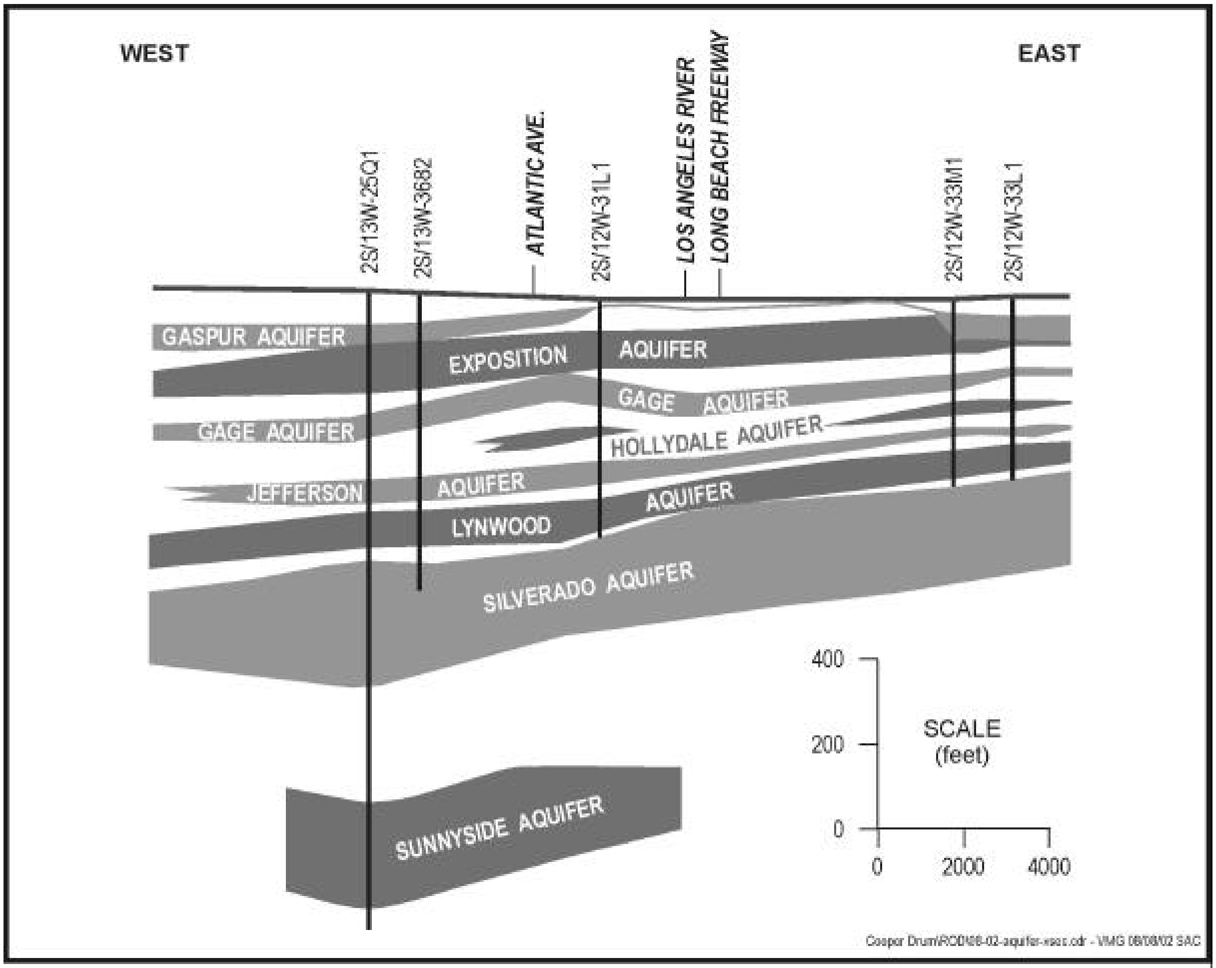

Figure 5-3. Deep Aquifer System and Production Wells

7.0 Summary of Site Risks

EPA completed a Human Health Risk Assessment (HHRA) for Cooper Drum in 2002 (URS, 2002). The HHRA estimates the human health and environmental risks that Cooper Drum could pose if no action were taken. It is one of the factors that EPA considers in deciding whether to take actions at a site. For Cooper Drum, EPA's decision to take action is based principally on the presence of contamination in groundwater at levels that exceed drinking water standards, evidence that contamination will continue to migrate into groundwater areas that are presently clean or less contaminated, and the potential use of groundwater in and around Cooper Drum as a source of drinking water. The risk assessment is also used to identify the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the ROD summarizes the results of the HHRA for Cooper Drum which can be found in the Cooper Drum RI/FS Report, Appendix L (URS, 2002).

7.1 Summary of Human Health Risk Assessment

This summary of health risk includes sections on the identification of contaminants of concern (COCs), the exposure assessment, toxicity assessment, and risk characterization.

7.1.1 Identification of Contaminants of Concern

The COCs driving the need for remedial action (risk drivers) are based on the data collected during the remedial investigation (RI) between 1996 and 2001. Sampling data were available from 11 groundwater wells and 17 soil borings sampled during this period. A total of 11 VOCs detected in the groundwater and soil contributed significantly to the estimated risks and are considered COCs. A total of 10 non-VOCs detected in the soil contributed significantly to the estimated risks and are considered site COCs. The concentrations of COCs found to pose potential threats to human health in the soil and groundwater at Cooper Drum are presented in Tables 7-1a to 7-1d. The tables also identify the exposure point concentrations (EPCs) for soil and groundwater, ranges of concentrations detected for each COC, the detection frequency (i.e., the number of times the chemical was detected in the samples collected at Cooper Drum), and how the EPC was derived. As shown in the tables, TCE and cis-1,2-DCE in groundwater are the most frequently detected COCs at Cooper Drum and have the highest EPCs. Lead in soil is the most frequently detected soil COC and also has the highest EPC. The principal COCs for the groundwater pathway are 1,2,3-trichloropropane, TCE, 1,2-DCA, and vinyl chloride. Other COCs contributing to the overall risk include 1,1-DCA, benzene, 1,2-dichloropropane, and PCE. The principal COC for the soil pathway is benzo(a)pyrene, with the PCB, Aroclor-1260, lead, benzo(b)fluoranthene, and dibenz(a,h)anthracene also contributing.

7.1.2 Exposure Assessment

Exposure refers to the potential contact of an individual (receptor) with a chemical. Exposure assessment is the determination or estimation of the magnitude, frequency, duration, and route of potential exposure. This section briefly summarizes the potentially exposed populations, the exposure pathways evaluated, and the exposure quantification from the HHRA performed for Cooper Drum.

A complete discussion of all the scenarios and exposure pathways is presented in the Cooper Drum RI/FS Report, Appendix L (URS, 2002) and is summarized in the following discussion and depicted in the Cooper Drum conceptual model (CSM) included as Figure 5-1.

As depicted in the CSM, the following pathways for current and future receptors were considered complete based on the presence of all four pathways and the nature of Cooper Drum, as well as the assumption that pavement, concrete, buildings, and other existing cover could be removed to expose the underlying soil.

- **Ingestion and direct contact with surface soil** (2 feet or less bgs) for on-site occupational workers, and shallow and deeper subsurface soils (0 to 12 feet bgs) for the hypothetical future on-site resident (adult and child) and construction worker;

- **Inhalation of airborne contaminants in outdoor air** (VOCs and particulate matter from subsurface and surface soils) for on- and off-site residents, occupational workers, and on-site construction workers;

- **Inhalation of indoor air contaminants in soil and groundwater** (particulate matter from surface and subsurface soils and VOCs from soils and groundwater) for on- and off-site residents and indoor occupational workers; and

- **Ingestion, dermal contact, and inhalation of groundwater contaminants** for domestic usage (washing, bathing, laundry, etc.) and as a potable drinking water supply for potential on-site and off-site residents (i.e., untreated water supply).

It should be noted that the assumption that residents could be exposed to contaminated groundwater from Cooper Drum is highly conservative. Contamination at Cooper Drum has not affected drinking water sources in the South Gate area. There are currently no wells providing a public drinking water supply from the contaminated shallow aquifer in the area of Cooper Drum. Further, regulations, such as the Safe Drinking Water Act, prohibit water purveyors from serving water contaminated in excess of drinking water standards (MCLs) to consumers.

7.1.3 Toxicity Assessment

Tables 7-1a to 7-1d show the 21 COCs that are the major risk contributors for Cooper Drum. Based on data from USEPA (IRIS), Cal/EPA (OEHHA) and other published data, of the 21 COCs two are classified as human carcinogens (EPA weight-of-evidence Class A), 12 are classified as probable human carcinogens (EPA weight-of-evidence class B2), three are possible human carcinogens, and the remaining four are noncarcinogenic. The carcinogenic oral/dermal and inhalation slope factors for the 17 carcinogenic COCs are presented in Table 7-2.

In addition to their classification as human carcinogens, 12 COCs have toxicity data indicating their potential for adverse noncarcinogenic health effects. The chronic toxicity data available for these compounds have been used to develop oral and inhalation reference doses (RfDs). The RfD represents a level that an individual may be exposed to that is not expected to cause any deleterious effect. The oral and inhalation RfDs are presented in Table 7-3. For complete information on toxicity of each chemical, see the Cooper Drum RI/FS Report, Appendix L (URS, 2002).

The following hierarchical approach is used to determine toxicity values:

- California Cancer Potency Factors (CPFs) developed by the California Environmental Protection Agency's (Cal/EPA's) Office of Environmental Health Hazard Assessment (OEHHA) (Cal/EPA 2001);

- EPA's Integrated Risk Information System (IRIS) database for toxicity value (i.e., noncarcinogenic RfDs, and carcinogenic SFs) (EPA 2000b);

- Chronic RfDs promulgated into California regulations, or used to develop environmental criteria that are promulgated into regulations; and

- Current edition of EPA's Health Effects Assessment Summary Tables (HEAST) (EPA 1997b).

7.1.4 Risk Characterization

This section presents the results of the evaluation of the potential risks to human health associated with exposure to contaminated soil and groundwater at Cooper Drum.

For carcinogens, risks are generally expressed as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to site-related contaminants. These risks are probabilities that are expressed in scientific notation (e.g., 1e-06). An excess lifetime cancer risk of 1e-06 indicates that an individual has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risks of cancer individuals face from other causes. The chance of an individual developing cancer from all other causes has been estimated to be as high as 1 in 3. EPA's generally acceptable risk range for site-related exposures is 1e-04 to 1e-06 (in effect, 1 in 10,000 to 1 in a 1,000,000). An excess lifetime cancer risk greater than 1 in 10,000 (1e-04) is the point at which action is generally required at a site (EPA 1991a).

The potential for noncarcinogenic effects is evaluated by comparing an exposure level, over a specified time period, with a reference dose (RfD), based on an average daily exposure or dose. The ratio of the dose to the RfD is referred to as the hazard quotient (HQ). An HQ less than one indicates that a receptor's dose is less than the RfD and that adverse toxic noncarcinogenic effects from exposure to that chemical are unlikely. The sum of all of the chemical and route-specific HQs is called the hazard index (HI). An HI less than one indicates that noncarcinogenic effects from all the contaminants are unlikely.

Conclusions

Tables 7-4 and 7-5 present the risk characterization summaries for carcinogenic and noncarcinogenic effects, respectively. The risk estimates presented in these tables are based on reasonable maximum exposure (RME) scenarios and were developed by taking into account various conservative assumptions about the frequency and duration of exposure to soil and groundwater, as well as the toxicity of the COCs. The results are summarized in the following paragraphs for the three exposure pathways (groundwater, soil, and indoor air).

The cumulative (soil, groundwater, indoor air) excess carcinogenic risk for the future resident at Cooper Drum is estimated at 3.4e-02 with a non-carcinogenic HI of 193. The groundwater contaminants 1,2,3-TCP, TCE, and 1,2-DCA are the principal risk drivers. TCE, 1,2-DCA, cis-1,2-DCE, and 1,2-DCP are the principal non-carcinogenic COCs driving the elevated HI. The hazards presented by these risk drivers are based on a hypothetical future on-site residential exposure to these COCs through ingestion and inhalation of water from an untreated groundwater supply at Cooper Drum. A response action is generally warranted if the cumulative excess carcinogenic risk to an individual exceeds 1e-04, or the non-carcinogenic HI value is greater than one.

The cumulative excess carcinogenic risk resulting from exposure to soil contaminants for a future resident at Cooper Drum is estimated at 3.4e-04, with an non-carcinogenic HI of 3. The principal carcinogenic risk drivers are benzo(a)pyrene, PCB (Aroclor-1260 and Aroclor-1254), benzo(b)fluoranthene, dibenz(a,h)anthracene, and PCE. The principal non-carcinogenic risk driver is Aroclor 1260. The exposure pathways primarily driving the risks include soil ingestion and dermal contact. In addition, the potential for elevated blood lead levels for the future resident and construction worker were evaluated. The results indicate that exposure to lead from on-site soils could result in elevated blood lead levels above the threshold value of 10 μg/dL.

Chemical-specific standards that define acceptable risk levels are also exceeded in groundwater at Cooper Drum when that groundwater is designated as a potential source of drinking water. Except for 1,2,3-TCP, the California and federal drinking water standards, or maximum contaminant level (MCL), were exceeded by all of the groundwater COCs. An enforceable drinking water standard for 1,2,3-TCP has not been promulgated. Additionally VOCs in soil and soil gas were evaluated using a computer model to estimate contaminant transport through the soil. The model results also indicate that VOCs in soil pose a health threat by leaching to groundwater and exceeding drinking water standards.

<u>Groundwater.</u> The exposure pathways and scenarios driving the health risks are the groundwater pathways (ingestion, inhalation, dermal contact) for the future resident. The carcinogenic risk drivers are 1,2,3-TCP (3e-02), TCE (7e-04), and 1,2-DCA (7e-04). Several other COCs, including VC (6e-04), 1,2-DCP (3e-04), and benzene (3e-04), also contribute to the high risks, but 1,2,3-TCP at concentrations detected in the on-site monitoring wells is the primary COC. Most of the risk is attributed to exposure through the inhalation (3e-02) and ingestion route (6e-03).

The noncarcinogenic risk drivers for the residential child are TCE (HI = 48), cis-1,2-DCE (HI = 45), 1,2-DCA (HI = 21), and 1,2-DCP (HI = 16). Ingestion and inhalation contribute almost equally to the estimated HI value resulting in respective route-specific HI values of 62 and 123.

Soil Pathway. Although several orders of magnitude below groundwater health risks, exposure to soil COCs constitute high risks. The estimated total excess lifetime cancer risks for the hypothetical on-site resident exposed to COCs in on-site soils is 3.3e-04. The principal risk driver is benzo(a)pyrene (1e-04), along with Aroclor-1260 (6e-05), benzo(b)fluoranthene (2e-05), dibenz(a,h)anthracene (2e-05), Aroclor-1254 (2e-05), and PCE (1e-05). The exposure pathways primarily driving the need for action include soil ingestion (2e-04) and dermal contact (8e-05).

The estimated potential health hazard HI for the future on-site residential child exposed to the soil COCs is 3.0. The potential health hazard is primarily attributed to soil ingestion of PCB, Aroclor-1254, (HI = 2). Also, exposure to lead concentrations of 1,920 to 3,240 mg/kg detected in subsurface and surface soils could result in elevated blood lead levels above the threshold level of 10 μg/dl, thereby posing a potential health risk to both the future resident and construction worker.

Indoor Air Pathway. The indoor air risks for the hypothetical resident and indoor occupational worker were based on actual soil, soil gas, and groundwater data, with the indoor air EPCs estimated using the Johnson and Ettinger model for subsurface vapor intrusion into buildings. The risks for the hypothetical residential receptor constitute high risks approaching one in one thousand (1e-03), primarily as a result of exposure to 1,2,3-TCP (6.1e-04), PCE (3.1e-04), and vinyl chloride (5e-05). For the indoor occupational worker, the risks were nearly as high at 2e-04, again due primarily as a result of exposure to 1,2,3-TCP (1e-04), PCE (7e-05), and VC (1e-05).

For the future residents, the cumulative exposure to multiple airborne VOCs estimated an HI value of 3.5, which indicates a potential for adverse health effects. However, no individual COC exceeds an HQ value of 1. For the indoor occupational worker, there is not an indication of potential for adverse health effects based on a HI value of 0.6.

7.1.5 Uncertainty Analysis

There are inherent uncertainties in the risk evaluation that generally overestimate but can also underestimate the potential human health risks at Cooper Drum. The most common uncertainties related to toxicity information includes using: 1) dose-response information from animal studies to predict effects in humans; and 2) dose-response information for effects observed at elevated doses to predict adverse effects following exposure at low levels.

The oral RfDs and slope factors (SFs) were used to determine risks for dermal exposure. These toxicity values are generally based on an administered dose which is not directly comparable to absorbed doses through the skin, or for target organs other than the skin. Consequently, health risks or adverse effects identified through this exposure route are estimated and should be viewed with a moderate to high degree of uncertainty.

Other uncertainties include the 1) use of conservative and health-protective exposure factors; 2) the maximum or 95% UCL concentrations used for EPCs are likely to overestimate the overall chemical concentrations throughout Cooper Drum; and 3) assumption that contaminated groundwater in the shallow water-bearing zone underlying Cooper Drum would be used as an untreated source of potable drinking water.

7.2 Summary of Ecological Risk Assessment

A scoping-level ecological risk assessment was conducted to assess the potential for the existence of ecological receptors and pathways between those receptors and chemicals of potential ecological concern (COPECs) associated with Cooper Drum. This ecological scoping assessment was conducted in conformance with the DTSC guidance and was designed to assess the need for a follow-up screening-level ecological risk assessment. The results of those activities are discussed in detail in the Cooper Drum RI/FS Report (URS, 2002).

EPA's evaluation of potential risks to ecological receptors indicates that there is virtually no habitat present for birds or mammals at Cooper Drum. There is also no available habitat for vegetation due to the industrial nature of the site. Consequently, the potential for ecological receptors to be exposed to soil contaminants would be considered extremely minimal, and there is no need for any additional screening-level ecological risk assessment.

7.3 Risk Assessment Conclusion

The principal COCs for the groundwater pathway are 1,2,3-trichloropropane, TCE, and 1,2-DCA. Other COCs contributing to the overall groundwater risk include benzene, 1,1-DCA, cis-1,2-DCE, 1,2-dichloropropane, PCE, and vinyl chloride. Exposure to COCs detected in groundwater poses the greatest health risk to potential receptors. However, exposure to chemicals in groundwater presupposes that wells would be constructed to access the shallow water-bearing zone underneath Cooper Drum, and that the water would be used as an untreated water supply for domestic use.

The principal cancer risk driver for the soil pathway is benzo(a)pyrene, along with the PCB, Aroclor-1260, lead, benzo(b)fluoranthene, and dibenz(a,h)anthracene. The estimated total RME cancer risks for the future on-site resident and worker exposed to COCs in on-site soils are 3 in 10,000 (3.3e-04) and 7 in 100,000 (6.7e-05), respectively. Exposure to chemicals in soil presupposes the existing cover of asphalt concrete (95% of the site) would be removed and contact with soil would be possible.

Exposure to site COCs in indoor air, by on- or off-site workers and residents, represents the most likely exposure pathway evaluated in the HHRA. The estimated total RME cancer risks for the future on-site resident and on-site worker are 9.9e-04 and 2.3e-04, respectively. Exposure to chemicals in indoor air presupposes the asphalt concrete would be removed and buildings would be built on Cooper Drum. Currently, the only enclosed office area is on the west side of Cooper Drum away from the VOC hot spot.

The response action selected in this Record of Decision (ROD) is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances, pollutants or contaminants from the Cooper Drum site which may present an imminent and substantial endangerment to public health or welfare.

Table 7-1a
Summary of Contaminants of Concern and
Medium-Specific Exposure Point Concentrations (Soil 0-2 feet)

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil

Exposure Point	Contaminants of Concern	Concentration Detected (mg/kg)		Frequency of Detection	Exposure Point Concentration (mg/kg)	Statistical Measure
		Min	Max			
Soil (0 - 2 ft bgs) On-site Direct Contact	Benzo(a)anthracene	1.1	2.7	3/13	2.7	Max
	Benzo(a)pyrene	0.78	4.3	3/13	4.3	Max
	Benzo(b)fluoranthene	0.69	6.6	3/13	6.6	Max
	Benzo(k)fluoranthene	0.98	4.6	3/13	4.6	Max
	Dibenz(a,h)anthracene	0.15	1.1	3/13	1.1	Max
	Indeno(1,2,3-cd)pyrene	0.3	2.1	4/13	2.1	Max
	Aroclor-1254	0.0049	1.4	6/14	1.4	Max
	Aroclor-1260	0.0018	5.5	6/14	5.5	Max
	Lead	2.2	3,240	11/12	3,240	Max*
	Tetrachloroethene (PCE)	0.001	0.2	9/16	0.122	95% UCL

*	Maximum concentration used because data do not fit either normal or lognormal distribution.
Min	minimum detected concentration
Max	maximum detected concentration
95% UCL	95% Upper Confidence Limit
mg/kg	milligrams per kilogram
bgs	below ground surface

Table 7-1b
Summary of Contaminants of Concern and Medium-Specific Exposure Point Concentrations (Soil 0-12 feet)

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil

Exposure Point	Contaminants of Concern	Concentration Detected (mg/kg) Min	Concentration Detected (mg/kg) Max	Frequency of Detection	Exposure Point Concentration (mg/kg)	Statistical Measure
Soil (0 - 12 ft. bgs) On-site Direct Contact	Benzo(a) anthracene	1.1	2.7	3/47	2.7	Max
	Benzo(a)pyrene	0.12	4.3	4/47	4.3	Max
	Benzo(b)fluoranthene	0.097	6.6	4/47	6.6	Max
	Benzo(k)fluoranthene	0.98	4.6	3/47	4.6	Max
	Chyrsene	0.12	4.7	4/47	4.7	Max
	Dibenz(a,h)anthracene	0.15	1.1	3/47	1.1	Max
	PCB Aroclor-1254	0.0049	2.1	12/47	2.1	Max
	PCB Aroclor-1260	0.0018	5.5	9/47	5.5	Max
	Lead	2.2	3,240	39/40	3,240	Max*
	Lead (without hot spot)	2.2	1,920	38/39	1,920	Max*
	Tetrachloroethene (PCE)	0.001	8.2	19/53	8.2	Max

Min minimum detected concentration
Max maximum detected concentration
bgs below ground surface
* Maximum concentration used because data do not fit either normal or lognormal distribution.

Table 7-1c
Summary of Contaminants of Concern
and Medium-Specific Exposure Point Concentrations (Groundwater)

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	Contaminants of Concern	Concentration Detected (μg/L)		Frequency of Detection	Exposure Point Concentration (μg/L)	Statistical Measure
		Min	Max			
	Benzene	0.5	30	24/30	30	Max
	1,1-Dichloroethane (1,1-DCA)	0.5	340	26/30	340	Max
	1,1-Dichloroethene (1,1-DCE)	0.5	54	27/30	48	95% UCL
	1,2-Dichloroethane (1,2-DCA)	0.4	100	27/30	90.2	95% UCL
	cis-1,2-Dichloroethene (c-1,2-DCE)	0.5	1,200	28/30	1,150	95% UCL
	trans-1,2-Dichloroethene (t-1,2-DCE)	0.5	46	27/30	46	Max
	1,2-Dichloropropane (1,2-DCP)	0.3	50	24/30	43.9	95% UCL
	Tetrachloroethene (PCE)	0.5	57	15/30	52.9	95% UCL
	Trichloroethene (TCE)	0.5	800	28/30	755	95% UCL
	1,2,3-Trichloropropane (TCP)	1	50	20/23	45	95% UCL
	Vinyl chloride	0.5	15	25/30	13.2	95% UCL

Min minimum detected concentration
μg/L microgram per liter
Max maximum detected concentration
95% UCL 95% Upper Confidence Limit

Table 7-1d
Summary of Contaminants of Concern and Medium-Specific Exposure Point Concentrations (Indoor Air)

Scenario Timeframe: Future
Media: Soil, groundwater, and soil gas
Exposure Medium: Indoor air

Exposure Point	Contaminants of Concern	Concentration Detected* (μg/m^3)		Frequency of Detection	Exposure Point Concentration** (μg/m^3)	Statistical Measure**
		Min	Max			
Indoor Air	Benzene	0.0023	0.0203	N/A	0.359	N/A
	1,4-Dichlorobenzene***	0.000289	0.1	N/A	0.565	N/A
	1,1-Dichloroethane (1,1-DCA)	0.338	2.90	N/A	4.93	N/A
	cis-1,2-Dichlorethene (c-1,2-DCE)	0.573	17	N/A	23.5	N/A
	1,2-Dichloropropane (1,2-DCP)	0.0154	0.232	N/A	0.316	N/A
	Tetrachloroethene (PCE)	0.155	119	N/A	120	N/A
	Trichloroethene (TCE)	0.966	4.57	N/A	6.49	N/A
	1,2,3-Trichloropropane (TCP) ****	0.253	0.468	N/A	0.697	N/A
	Vinyl chloride	0.0847	1.51	N/A	1.59	N/A

* Concentrations were developed from soil and groundwater concentrations using the Johnson and Ettinger Model. (USEPA 2000).
** Total concentration from all media.
*** A surrogate, 1,2-Dichlorobenzene was used to estimate indoor air concentrations.
**** A surrogate, 1,1-Dichloroethene was used to estimate indoor air concentrations.
Min minimum detected concentration
Max maximum detected concentration
N/A Not available or applicable
μg/m^3 microgram per cubic meter

Table 7-2
Cancer Toxicity Data Summary
(Page 1 of 2)

Pathway: **Ingestion, Dermal**

Contaminants of Concern	**Oral/Dermal Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$**	**Weight of Evidence Classification**	**Source**	**Date (MM/DD/YYYY)**
Benzene	0.1	A	Ca	05/01/2002
1,1-Dichloroethane (1,1-DCA)	0.0057	C	Ca	05/01/2002
1,2-Dichloroethane (1,2-DCA)	0.091	B2	i	01/01/1991
1,2-Dichloropropane (1,2-DCP)	0.068	C	h	10/01/1999
Tetrachloroethene (PCE)	0.052	B2	n	10/01/1999
Trichloroethene (TCE)	0.0153	B2	Ca	05/01/2002
1,2,3-Trichloropropane (TCP)	7	C	h	10/01/1999
Vinyl chloride	1.55	A	i	08/07/200
Benzo(a) anthracene	1.2	B2	Ca	05/01/2002
Benzo(a)pyrene	12	B2	Ca	05/01/2002
Benzo(b) fluoranthene	1.2	B2	Ca	05/01/2002
Benzo(k)fluoranthene	1.2	B2	Ca	05/01/2002
Chrysene	0.12	B2	Ca	05/01/2002
Dibenz(a,h)anthracene	7.3	B2	Ca	05/01/2002
Indeno (1,2,3-cd) pyrene	1.2	B2	Ca	05/01/2002
Aroclor-1254	5	B2	Ca	05/01/2002
Aroclor-1260	5	B2	Ca	05/01/2002

Ca Cal/EPA Cancer Potency Factor (CPF) value, Office of Environmental Health Hazard Assessment (OEHHA) (Cal/EPA)
h Health Effect Assessment Summary Tables (HEAST) - from USEPA Region 9 PRG Table (USEPA 2000)
i Integrated Risk Information System (IRIS) (USEPA 2001)
r route-to-route extrapolation - from USEPA Region 9 PRG Table (USEPA 2000)
n National Cancer for Environmental Assessment (NCEA) - from USEPA Region 9 PRG Table (USEPA 2000)
N/A Not available or applicable
A Human carcinogen
B2 Probably human carcinogen - Indicates sufficient evidence in animals and inadequate or no evidence in humans
C Possible human carcinogen

Table 7-2
Cancer Toxicity Data Summary
(Page 2 of 2)

Pathway: Inhalation

Contaminants of Concern	Unit Risk ($\mu g/m^3$)	Inhalation Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Weight of Evidence/ Cancer Guideline Description	Source	Date (MM/DD/YYYY)
Benzene	2.9e-05	0.1	A	Ca	10/01/1999
1,1-Dichloroethane (1,1-DCA)	1.6e-06	0.0057	C	Ca	05/01/2002
1,2-Dichloroethane (1,2-DCA)	2.2e-05	0.091	B2	i	01/01/1991
1,2-Dichloropropane (1,2-DCP)	1.8e-05	0.068	--	r	10/01/1999
Tetrachloroethene (PCE)	5.9e-06	0.0210	B2	Ca	05/01/2002
Trichloroethene (TCE)	2.0e-06	0.01	B2	Ca	05/01/2002
1,2,3-Trichloropropane (TCP)	N/A	7	C	r	10/01/1999
Vinyl chloride	7.8e-05	0.27	A	Ca	05/01/2002
Benzo(a)anthracene	1.1e-04	0.39	B2	Ca	05/01/2002
Benzo(a)pyrene	1.1e-03	3.9	B2	Ca	05/01/2002
Benzo(b) fluoranthene	1.1e-04	0.39	B2	Ca	05/01/2002
Benzo(k)fluoranthene	1.1e-04	0.39	B2	Ca	05/01/2002
Chrysene	1.1e-05	0.039	B2	Ca	05/01/2002
Dibenz(a,h)anthracene	1.2e-03	4.1	B2	Ca	05/01/2002
Indeno (1,2,3-cd) pyrene	1.1e-04	0.39	B2	Ca	05/01/2002
Aroclor-1254	5.7e-04	2.00	B2	Ca	05/01/2002
Aroclor-1260	5.7e-04	2.00	B2	Ca	05/01/2002

Ca	Cal/EPA Cancer Potency Factor (CPF) value, Office of Environmental Health Hazard Assessment (OEHHA) (Cal/EPA)
h	Health Effect Assessment Summary Tables (HEAST) - from USEPA Region 9 PRG Table (USEPA 2000)
i	Integrated Risk Information System (IRIS) (USEPA 2001)
r	route-to-route extrapolation - from USEPA Region 9 PRG Table (USEPA 2000)
n	National Cancer for Environmental Assessment (NCEA) - from USEPA Region 9 PRG Table (USEPA 2000)
N/A	Not available or applicable
A	Human carcinogen
B2	Probably human carcinogen - Indicates sufficient evidence in animals and inadequate or no evidence in humans
C	Possible human carcinogen

Table 7-3
Non-Cancer Toxicity Date Summary
(Page 1 of 2)

Pathway: **Ingestion, Dermal**

Contaminants of Concern	Chronic/ Subchronic	Oral/Dermal RfD Value (mg/kg-day)	Primary Target Organ	Source	Dates of RfD: Target Organ (MM/DD/YYYY)
Benzene	Chronic	0.1	blood	h	10/01/1999
1,1-Dichloroethane (1,1-DCA)	Chronic	0.1	kidney	h	10/01/1999
1,2-Dichloroethane (1,2-DCA)	Chronic	0.0014	kidney	n	10/01/1999
1,1-Dichloroethene (1,1-DCE)	Chronic	0.057	liver	i	08/13/2002
1,2-Dichloropropane (1,2-DCP)	Chronic	0.0011	nasal mucous	r	10/01/1999
cis-1,2-Dichloroethene (cis-1,2-DCE)	Chronic	0.001	blood	h	10/01/1999
trans-1,2-Dichloroethene (trans-1,2-DCE)	Chronic	0.001	blood	i	01/01/1989
Tetrachloroethene (PCE)	Chronic	0.11	liver	i	03/01/1998
Trichloroethene (TCE)	Chronic	0.006	liver	x	10/01/1999
1,2,3-Trichloropropane (TCP)	Chronic	0.005	body mass	i	08/01/1990
Vinyl chloride	Chronic	0.029	liver	i	08/07/2000
Aroclor-1254	Chronic	2.0e-05	immune system	i	11/01/1996

N/A Not available; chemical is non-carcinogenic or toxicity values not established.
h Health Effect Assessment Summary Tables (HEAST) - from USEPA Region 9 PRG Table
i Integrated Risk Information System (IRIS) - USEPA 2001
r route-to-route extrapolation - from USEPA Region 9 PRG Table
n National Center for Environmental Assessment (NCEA) - from USEPA Region 9 PRG Table
x Value currently under review - from USEPA Region 9 PRG Table

Table 7-3
Non-Cancer Toxicity Date Summary
(Page 2 of 2)

Pathway: Inhalation

Contaminants of Concern	Chronic/ Subchronic	Inhalation RfD (mg/kg-day)	Primary Target Organ	Source	Dates of RfD: Target Organ (MM/DD/YYYY)
Benzene	Chronic	0.0017	blood	r	10/01/1999
1,1-Dichloroethane (1,1-DCA)	Chronic	0.14	kidney	h	10/01/1999
1,2-Dichloroethane (1,2-DCA)	Chronic	0.0014	lungs	n	10/01/1999
1,1-Dichloroethene (1,1-DCE)	Chronic	0.057	liver	i	08/13/2002
1,2-Dichloropropane (1,2-DCP)	Chronic	0.0011	nasal mucous, blood	i	12/01/1991
cis-1,2-Dichloroethene (cis-1,2-DCE)	Chronic	0.001	blood	r	10/01/1999
trans-1,2-Dichloroethene (trans-1,2-DCE)	Chronic	0.002	immune system, blood	r	10/01/1999
Tetrachloroethene (PCE)	Chronic	0.11	liver	n	10/01/1999
Trichloroethene (TCE)	Chronic	0.006		r	10/01/1999
1,2,3-Trichloropropane (TCP)	Chronic	0.005	body mass	r	10/01/1999
Vinyl chloride	Chronic	0.029	liver	i	08/07/2000
Aroclor-1254	Chronic	2.00e-05	immune system	r	10/01/1999

N/A Not available; chemical is non-carcinogenic or toxicity values not established.
h Health Effect Assessment Summary Tables (HEAST) - from USEPA Region 9 PRG Table
i Integrated Risk Information System (IRIS) - USEPA 2001
r route-to-route extrapolation - from USEPA Region 9 PRG Table
n National Center for Environmental Assessment (NCEA) - from USEPA Region 9 PRG Table
x Value currently under review - from USEPA Region 9 PRG Table

Table 7-4a
Risk Characterization Summary - Carcinogens (Worker)
(Page 1 of 2)

Scenario Timeframe: Current
Receptor Population: On-site Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Contaminants of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Total
Soil	Soil	On-site-Direct Contact	Benzo(a)anthracene	5.7e-07	1.3e-12	9.7e-07	1.5e-06
		On-site-Direct Contact	Benzo(a) pyrene	9.0e-06	2.1e-11	1.5e-05	2.4e-05
		On-site-Direct Contact	Benzo(b) fluoranthene	1.4e-06	3.3e-12	2.4e-06	3.8e-06
		On-site-Direct Contact	Benzo(k) fluoranthene	9.7e-07	2.3e-12	1.7e-06	2.7e-06
		On-site-Direct Contact	Dibenz(a,h) anthracene	1.4e-06	5.7e-12	2.4e-06	3.8e-06
		On-site-Direct Contact	Indeno(1,2,3-cd)pyrene	4.4e-07	1.2e-12	7.6e-07	1.2e-06
		On-site-Direct Contact	Aroclor-1254	1.2e-06	3.6e-12	2.4e-06	3.6e-06
		On-site-Direct Contact	Aroclor-1260	4.8e-06	1.4e-11	9.5e-06	1.4e-05
		On-site-Direct Contact	Tetrachloroethene (PCE)	1.1e-09	5.6e-06	1.5e-09	5.6e-06
						Soil Risk Total =	6.7e-05

Table 7-4a
Risk Characterization Summary - Carcinogens (Worker)
(Page 2 of 2)

Scenario Timeframe: Current
Receptor Population: On-site Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Contaminants of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Total
Soil, Ground water, Soil Gas	Indoor Vapors (VOCs)	Inhalation of Indoor Air	Benzene	N/A	1.0e-06	N/A	1.0e-06
		Inhalation of Indoor Air	1,4-Dichlorobenzene	N/A	6.4e-07	N/A	6.4e-07
		Inhalation of Indoor Air	Tetrachloroethene (PCE)	N/A	7.2e-05	N/A	7.2e-05
		Inhalation of Indoor Air	Trichloroethene (TCE)	N/A	1.8e-06	N/A	1.8e-06
		Inhalation of Indoor Air	1,2,3-Trichloropropane (TCP)	N/A	1.4e-04	N/A	1.4e-04
		Inhalation of Indoor Air	Vinyl Chloride	N/A	1.2e-05	N/A	1.2e-05
						Air Risk Total =	2.3e-04
						Total Risk =	2.9e-04

N/A route of exposure is not applicable to this medium
VOCs volatile organic compounds

Table 7-4b
Risk Characterization Summary - Carcinogens (Resident)
(Page 1 of 3)

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/child

Medium	Exposure Medium	Exposure Point	Contaminants of Concern	Carcinogenic Risk			
				Ingestion	**Inhalation**	**Dermal**	**Exposure Routes Total**
Soil	Soil	Soil On-site Direct Contact	Benzo(a) anthracene	5.1e-06	2.9e-12	2.1e-06	7.1e-06
		Soil On-site Direct Contact	Benzo(a) pyrene	8.1e-05	4.6e-11	3.3e-05	1.1e-04
		Soil On-site Direct Contact	Benzo(b) fluoranthene	1.2e-05	7.0e-12	5.1e-06	1.7e-05
		Soil On-site Direct Contact	Benzo(k) fluoranthene	8.6e-06	4.9e-12	3.6e-06	1.2e-05
		Soil On-site Direct Contact	Chrysene	8.8e-07	1.5e-08	3.6e-07	1.3e-06
		Soil On-site Direct Contact	Dibenz(a,h) anthracene	1.3e-05	1.2e-11	5.2e-06	1.8e-05
		Soil On-site Direct Contact	Aroclor-1254	1.6e-05	7.6e-12	7.8e-06	2.4e-05
		Soil On-site Direct Contact	Aroclor-1260	4.3e-05	3.0e-11	2.0e-05	6.3e-05
		Soil On-site Direct Contact	Dieldrin	1.0e-06	1.4e-12	3.2e-07	1.3e-06
		Soil On-site Direct Contact	Tetrachloroethene (PCE)	6.7e-07	1.2e-05	2.1e-07	1.3e-05
						Soil Risk Total =	3.3e-04

Table 7-4b
Risk Characterization Summary - Carcinogens (Resident)
(Page 2 of 3)

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/child

Medium	Exposure Medium	Exposure Point	Contaminants of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground water	Groundwater	Gaspur Aquifer - Tap Water	Benzene	4.5e-05	2.2e-04	2.4e-06	2.7e-04
		Gaspur Aquifer - Tap Water	1,1-Dichloroethane (1,1-DCA)	2.9e-05	1.5e-04	6.7e-07	1.8e-04
		Gaspur Aquifer - Tap Water	1,2,3-trichloropropane	4.7e-03	2.4e-02	6.1e-05	2.9e-02
		Gaspur Aquifer - Tap Water	1,2-Dichloroethane (1,2-DCA)	1.2e-04	6.1e-04	1.7e-06	7.3e-04
		Gaspur Aquifer - Tap Water	1,2-Dichloropropane (1,2-DCP)	4.5e-05	2.2e-04	1.2e-06	2.7e-04
		Gaspur Aquifer - Tap Water	Tetrachloroethene (PCE)	4.1e-05	8.3e-05	5.1e-06	1.3e-04
		Gaspur Aquifer - Tap Water	Trichloroethene (TCE)	1.7e-04	5.6e-04	7.2e-06	7.4e-04
		Gaspur Aquifer - Tap Water	Vinyl chloride	3.1e-04	2.7e-04	5.8e-06	5.9e-04
						Groundwater Risk Total =	3.2e-02

Table 7-4b
Risk Characterization Summary - Carcinogens (Resident)
(Page 3 of 3)

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/child

Medium	Exposure Medium	Exposure Point	Contaminants of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil, Ground water, soil gas	Indoor Air	Inhalation of Indoor Air	Benzene	N/A	4.4e-06	N/A	4.4e-06
		Inhalation of Indoor Air	1,4-Dichlorobenzene	N/A	2.8e-06	N/A	2.8e-06
		Inhalation of Indoor Air	1,1-Dichloroethane (1,1-DCA)	N/A	3.5e-06	N/A	3.5e-06
		Inhalation of Indoor Air	1,2-Dichloropropane (1,2-DCP)	N/A	2.7e-06	N/A	2.7e-06
		Inhalation of Indoor Air	Tetrachloroethene (PCE)	N/A	3.1e-04	N/A	3.1e-04
		Inhalation of Indoor Air	Trichloroethene (TCE)	N/A	8.0e-06	N/A	8.0e-06
		Inhalation of Indoor Air	1,2,3-Trichloropropane	N/A	6.1e-04	N/A	6.1e-04
		Inhalation of Indoor Air	Vinyl Chloride	N/A	5.3e-05	N/A	5.3e-05
Indoor Air Risk Total =							9.9e-04
Total Risk (soil, groundwater, indoor air) =							3.4e-02

N/A Route of exposure is not applicable to this medium
NC Non-carcinogenic (USEPA Class D or E)

Table 7-5a
Risk Characterization Summary - Non-Carcinogens (Worker)
(Page 1 of 1)

Scenario Timeframe: Current
Receptor Population: Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Contaminants of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient (HQ)			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil	Soil On-Site Direct Contact	Aroclor-1254	immune system	3.4e-02	2.5e-07	6.8e-02	1.0e-01
		Soil On-Site Direct Contact	Tetrachloroethene (PCE)	liver (hepa toxicity)	6.0e-06	6.8e-03	7.9e-06	6.8e-03
							Soil HI Total =	0.3
Soil, Ground water, soil gas	Indoor Air	Inhalation of Indoor Air	Benzene	blood	N/A	0.02	N/A	0.02
		Inhalation of Indoor Air	1,4-Dichlorobenzene	liver	N/A	2.0e-04	N/A	2.0e-04
		Inhalation of Indoor Air	1,1-Dichloroethane (1,1-DCA)	kidney	N/A	2.8e-03	N/A	2.8e-03
		Inhalation of Indoor Air	cis-1,2-Dichloroethene (c-1,2-DCE)	blood	N/A	0.2	N/A	0.2
		Inhalation of Indoor Air	1,2-Dichloropropane (1,2-DCP)	nasal mucous	N/A	0.02	N/A	0.02
		Inhalation of Indoor Air	Tetrachloroethene (PCE)	liver	N/A	0.1	N/A	0.1
		Inhalation of Indoor Air	Trichloroethene (TCE)	liver	N/A	0.1	N/A	0.1
		Inhalation of Indoor Air	1,2,3-Trichloropropane	Body mass	N/A	0.01	N/A	0.01
		Inhalation of Indoor Air	Vinyl Chloride	liver	N/A	4.4e-03	N/A	4.4e-03
							Indoor Air HI Total =	0.6
							Total HI (soil, indoor air) =	0.9

N/A Route of exposure is not applicable to this medium

Table 7-5b
Risk Characterization Summary - Non-Carcinogens (Resident)
(Page 1 of 3)

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Contaminants of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient (HQ)			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Soil and airborne particulate matter and vapors (VOCs)	Soil On-site Direct Contact, Inhalation	Aroclor-1254	immune system	1.3e+00	8.1e-07	5.6e-01	1.9e+00
		Soil On-site Direct Contact, Inhalation	Dieldrin	liver	1.1e-02	7.2e-09	2.9e-03	1.3e-02
		Soil On-site Direct Contact, Inhalation	Lead	CNS	99th percentile blood lead levels = 36.0 μg/dL (adult) and 127.3 μg/dL (child)			
		Soil On-site Direct Contact, Inhalation	Lead (without hot sport)	CNS	99th percentile blood lead levels = 22.7 μg/dL (adult) and 77.3 μg/dL (child)			
		Soil On-site Direct Contact, Inhalation	Tetrachloro ethene (PCE)	liver	1.1e-02	2.2e-02	2.9e-03	3.5e-02
							Soil HI Total =	3.0

Table 7-5b
Risk Characterization Summary - Non-Carcinogens (Resident)
(Page 2 of 3)

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Contaminants of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient (HQ)			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground Water	Ground Water	Gaspur Aquifer - Tap Water	Benzene	blood	6.4e-01	5.6e+00	2.9e-02	6.3e+00
		Gaspur Aquifer - Tap Water	1,1-Dichloro-ethane (1,1-DCA)	kidney	2.2e-01	7.8e-01	4.2e-03	1.0e+00
		Gaspur Aquifer - Tap Water	1,1-Dichloro-ethene (1,1-DCE)	liver	6.1e-02	2.7e-01	2.1e-03	3.3e-01
		Gaspur Aquifer - Tap Water	1,2,3-trichloro-propane (TCP)	blood	4.8e-01	2.9e+00	5.1e-03	3.4e+00
		Gaspur Aquifer - Tap Water	1,2-Dichloro-ethane (1,2-DCA)	lungs	1.9e-01	2.1e+01	2.2e-03	2.1e+01
		Gaspur Aquifer - Tap Water	1,2-Dichloro-propane (1,2-DCP)	olfactory (nasal) epithelium, blood	2.6e+00	1.3e+01	5.4e-02	1.6e+01
		Gaspur Aquifer - Tap Water	cis-1,2-Dichloro-ethene (c-1,2-DCE)	decreased hemato-crit and hemo-globin	7.4e+00	3.7e+01	1.6e-01	4.5e+01
		Gaspur Aquifer - Tap Water	Tetrachloro-ethene (PCE)	liver	3.4e-01	1.5e-01	3.5e-02	5.3e-01
		Gaspur Aquifer - Tap Water	trans-1,2-Dichloroethene (t-1,2-DCE)	immune system, spleen, blood	1.5e-01	7.3e-01	3.1e-03	8.8e-01
		Gaspur Aquifer - Tap Water	Trichloroethene (TCE)	liver	8.0e+00	4.0e+01	2.7e-01	4.8e+01
		Gaspur Aquifer - Tap Water	Vinyl chloride	liver	2.8e-01	1.5e-01	4.4e-03	4.3e-01
							Groundwater HI Total =	186

Table 7-5b
Risk Characterization Summary - Non-Carcinogens (Resident)
(Page 3 of 3)

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Contaminants of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient (HQ)			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil and Ground water	Indoor Air	Inhalation of Indoor Air	Benzene	hemato-poietic effects	N/A	1.0e-01	N/A	1.0e-01
		Inhalation of Indoor Air	1,4-Dichlorobenzene	liver	N/A	1.2e-03	N/A	1.2e-03
		Inhalation of Indoor Air	1,1-Dichloroethane (1,1-DCA)	kidney	N/A	1.7e-02	N/A	1.7e-02
		Inhalation of Indoor Air	1,2-Dichloropropane (1,2-DCP)	olfactory epithelium, blood	N/A	1.4e-01	N/A	1.4e-01
		Inhalation of Indoor Air	Tetrachloroethene (PCE)	liver	N/A	5.3e-01	N/A	5.3e-01
		Inhalation of Indoor Air	Trichloroethene (TCE)	liver	N/A	5.3e-01	N/A	5.3e-01
		Inhalation of Indoor Air	1,2,3-Trichloropropane	blood	N/A	6.8e-02	N/A	6.8e-02
		Inhalation of Indoor Air	Vinyl chloride	liver	N/A	2.7e-02	N/A	2.7e-02
							Air HI Total =	3.5
							Total HI (soil, groundwater, indoor air) =	192.5

N/A route of exposure is not applicable to this medium
CNS central nervous system

8.0 Remedial Action Objectives

The remedial action objectives (RAOs) for Cooper Drum are to protect human health and the environment from exposure to contaminated soil, groundwater, and indoor air, and to restore the groundwater to a potential beneficial use as a drinking water source. The selected remedy meets these RAOs through treatment of soil and groundwater contaminated with VOCs and, where feasible, the removal of soil contaminated with non-VOCs. The RAOs also serve to facilitate the five-year review determination of protectiveness of human health and the environment.

The RAOs for Cooper Drum are listed below:

<u>Groundwater</u>

- Restore the groundwater through VOC treatment to drinking water standards (MCLs) for beneficial use;

<u>Soil</u>

- Remediate soil COCs (VOCs) to prevent contaminants from migrating into groundwater at levels that would exceed drinking water standards; and

- Where feasible, remediate non-VOC contaminated soil above health-based action levels that are protective of ongoing and potential future site uses.

<u>Indoor Air</u>

- Remediate COCs (VOCs) in soil and groundwater to health-based action levels to eliminate potential exposures to indoor air contaminants created by site contamination.

The RAOs were formed based on the following:

- Reasonable anticipated land use scenarios used in the human health risk assessment that include continuation of heavy industrial land use and the possibility of future development for on-site residential land use;

- The soil contaminants pose a continuing contaminant threat to the aquifer (identified as a potential drinking water source) underlying Cooper Drum; and

- The human health risk assessment identified the COCs driving the need for remedial action (risk drivers) and need for remedial action protective of human health.

9.0 Description of Alternatives

From the screening of technologies, EPA evaluated and assembled a range of alternatives including:

Soil Alternatives

- Alternative 1 - No Action
- Alternative 2 - Dual Phase Extraction/GAC*/Institutional Control
- Alternative 3 - Dual Phase Extraction/GAC/Institutional Control/Excavation

* GAC - Granular Activated Carbon

Groundwater Alternatives

- Alternative 1 - No Action
- Alternative 2 - Extraction/GAC
- Alternative 3 - Extraction/GAC/In Situ Chemical Oxidation*
- Alternative 4 - Extraction/GAC/In Situ Chemical Treatment - Reductive Dechlorination and Oxidation
- Alternative 5 - Extraction/GAC/In Situ Chemical Treatment - Reductive Dechlorination*
- Alternative 6 - In-Well Air Stripping with Groundwater Circulation Wells

* Groundwater Alternatives 3, 4, and 5 share the common components of extraction and ex situ physical treatment for VOCs. With regards to in situ treatment, groundwater Alternative 4 (chemical oxidation and reductive dechlorination) is a combination of Alternative 3 (chemical oxidation) and 5 (reductive dechlorination). Therefore, groundwater Alternatives 3 and 5 have been deleted from the ROD as separate alternatives.

9.1 Description of Soil Alternatives/Remedy Components

9.1.1 Soil Alternative 1 - No Action

In accordance with the NCP, a no action alternative must be evaluated to serve as a basis for comparison with other remedial alternatives. Under this remedial action, no action is undertaken toward cleanup or reducing the risk to human health. There is no capital cost or operation and maintenance cost associated with this alternative. Because this alternative is not protective of human health and the environment and does not comply with applicable or relevant and appropriate requirements (ARARs), this alternative is not further evaluated.

9.1.2 Soil Alternative 2 - Dual Phase Extraction/GAC/Institutional Controls

Treatment Components

This alternative applies a physical treatment technology combined with institutional controls. The physical treatment entails using dual phase extraction (DPE) to treat the VOCs in soil. DPE is an enhancement of the conventional soil vapor extraction (SVE) technology; it is a process in which contaminated soil vapors and groundwater are extracted simultaneously. SVE has been established as an EPA presumptive remedy for cleanup of VOCs in soil. The alternative includes three wells to extract both groundwater and soil gas and five vapor monitoring wells. Soil vapors and groundwater contaminants would be extracted and treated with granular activated carbon (GAC) in vessels. Additives, such as potassium permanganate, would be used to treat any vinyl chloride contamination. There are two discharge options for the treated groundwater, discharge to publicly owned treatment works (POTW) and reinjection to the aquifer. The treated soil gas would be discharged into the atmosphere. The estimated soil volume to be treated under the HWA using DPE is approximately 77,000 cubic yards (this assumes treatment down to a depth of 50 feet bgs.)

Institutional Control Components

Institutional controls will be placed on Cooper Drum to restrict use. These controls limit future use of Cooper Drum by eliminating exposure to non-VOC soil contaminants and consist of a restrictive covenant which will: 1) place limitations on activities that might expose the subsurface; 2) prevent future use including residential, hospital, day care center and school uses; and 3) notify property users and the public of these controls. This restrictive covenant will be binding on subsequent property owners and will remain in place as long as soil contaminated with non-VOCs remains on the property and poses a health risk.

Monitoring Components

The total duration of the DPE remedial action is assumed to be five years. Operation of the DPE system is estimated to continue for approximately two years. One baseline sampling event and three post-remedial action compliance sampling events of vapor monitoring and groundwater extraction wells are planned.

Operation and Maintenance (O&M) Components

O&M activities for VOC treatment using DPE are related to upkeep of the extraction systems and the liquid and vapor GAC treatment facilities, including controls and communications systems, mechanical components (e.g., blowers, submersible pumps, flow meters, valves, connections), disposal of spent GAC and recharging of the GAC vessels, pipeline maintenance, extraction and vapor monitoring well maintenace, grounds upkeep, and reporting of spills, uncontrolled emissions, or other anomalous occurrences.

O&M activities related to institutional controls consist of administrative oversight of site activities and periodic inspections.

Expected Outcomes

Dual phase extraction is expected to remove existing VOC contamination in soil to levels that prevent impact to the aquifer below ground and to the indoor air quality above ground. Since non-VOC soil contamination will be left on site under Alternative 2, institutional controls will be implemented on Cooper Drum to restrict future land use, including residential, hospital, day care center and school uses.

9.1.3 Soil Alternative 3 Dual Phase Extraction/GAC/ Institutional Controls/Excavation

Treatment Components

Alternative 3 is similar to Alternative 2 in that it applies physical treatment combined with institutional controls, but it also includes the excavation and off-site disposal of soil contaminated with non-VOCs. DPE with GAC treatment, as described in Alternative 2, would be used to remediate an estimated 77,000 cubic yards of VOC-contaminated soil. Excavation would remove an estimated 2,700 tons of contaminated soil and effectively remove any potential health risk resulting from exposure to non-VOCs. Soil would be transported off site to an approved landfill.

Institutional Control Components

Institutional controls would be used in areas where soil excavation is not feasible. Emission control measures would be taken during soil excavation to eliminate potential problems associated with dust and exposure to subsurface contaminants.

Monitoring Components

Vapor monitoring requirements would be similar to Alternative 2. Confirmation soil samples would be obtained in excavated soil areas.

Operation and Maintenance (O&M) Components

O&M activities for VOC treatment using DPE and institutional controls are the same as for Alternative 2.

Expected Outcomes

Dual phase extraction is expected to remove existing VOC contamination in soil to levels that prevent impact to the aquifer below ground and to the indoor air quality above ground. No land use restrictions are expected if all soil contaminated with non-VOCs is excavated and removed off site. Restrictions on future land use, including residential, hospital, day care center and school uses, will be implemented for Cooper Drum with the understanding that excavation of all non-VOC contaminated soil is deemed infeasible (e.g., under existing structures). Land use restrictions could be lifted if the contaminated soil beneath structures is removed or treated prior to future land development.

9.2 Description of Groundwater Alternatives/Remedy Components

9.2.1 Groundwater Alternative 1 - No Action

In accordance with the NCP, a no action alternative must be evaluated to serve as a basis for comparison with other remedial alternatives. Under this remedial action, no action is undertaken toward cleanup or reducing the risk to human health. There is no capital cost or operation and maintenance cost associated with this alternative. Because this alternative is not protective of human health and the environment and does not comply with ARARs, this alternative is not further evaluated.

9.2.2 Groundwater Alternative 2 - Extraction/GAC

Treatment Components

Alternative 2 applies physical treatment technology using vertical wells to extract VOC-contaminated groundwater and liquid-phase GAC vessels to remove the VOCs. The alternative would contain the groundwater contamination beneath Cooper Drum. However, groundwater extraction may result in further commingling of on-site plumes with upgradient plumes originating off site. Three vertical extraction wells would be used to extract groundwater at a rate of up to 33 gallons per minute (gpm) per well. The rate of extraction would have to be closely monitored and adjusted to minimize the potential for plume commingling.

The extracted water would be pumped through two vessels containing liquid-phase activated carbon. The treatment plant capacity would be 100 gpm. To treat vinyl chloride, potassium permanganate would also be added. In this way, all COCs in groundwater would be treated down to drinking water standards.

Containment Components

Groundwater extraction would contain and control further migration of the plume. The treated water could be reinjected into the groundwater aquifer or discharged to a POTW. If reinjection is selected, three new injection wells would be installed upgradient of the HWA. Reinjection of treated groundwater into the plume must meet state policies and waste discharge conditions. The benefits of reinjection include reducing the possible commingling with off-site plumes, diluting the groundwater contaminants, and flushing the contaminants toward the extraction wells. Discharge to a POTW located off site would have to comply with waste discharge requirements and payment of connection and usage fees.

Monitoring Components

Depending on various factors, the time required to capture the VOC plume was estimated to be between 13 and 20 years. For cost estimation purposes, the duration of remedial action was set to 20 years. After the first year of operation, the monitoring frequency for VOCs would be as follows: bi-weekly at the treatment plant, monthly at the extraction wells, and semi-annually at the monitoring wells. Annual compliance monitoring of all wells would continue for at least three years after completion of remedial action. This monitoring scheme was the basis of the cost analysis, however, site conditions may require changes to monitoring frequencies.

Required O&M

O&M activities for VOC treatment are related to upkeep of the extraction systems and the liquid GAC treatment facilities, including controls and communications systems, mechanical components (e.g., external and submersible pumps, flow meters, valves, connections), disposal of spent GAC and recharging of the GAC vessels, pipeline maintenance, extraction and injection well maintenace (may include periodic cleaning/acid washing), monitoring well maintenace, grounds upkeep, and reporting of spills or other anomalous occurrences.

Expected Outcomes

The contaminated groundwater under Cooper Drum is semi-confined in the upper aquifer. Implementation of groundwater Alternative 2 would remove VOC contamination above drinking water standards in the shallow aquifer and would protect the existing beneficial use of the currently uncontaminated deeper aquifers.

9.2.3 Groundwater Alternative 4 - Extraction/GAC/In Situ Chemical Treatment-Reductive Dechlorination and Oxidation

Treatment Components

Alternative 4 combines the use of ex situ physical and in situ chemical treatment technologies. Similar to Alternative 2, physical treatment would entail extracting groundwater contaminated with VOCs and treating it with GAC, so as to clean up and contain the groundwater contamination underneath Cooper Drum. Chemical treatment of VOCs in groundwater would be enhanced with in situ chemical treatment using either reductive dechlorination or chemical oxidation.

Use of enhanced reductive dechlorination treatment could expedite natural attenuation without the need for chemical oxidants. Because of the reliance on natural attenuation processes, the time required for complete cleanup is uncertain. If a chemical oxidant is used, oxidation would occur fairly quickly (i.e., within days).

Pilot-scale treatability studies would be required to determine the effectiveness of in situ reductive dechlorination and chemical oxidation. The results of the treatability tests would be used to determine which in situ technology (i.e., reductive dechlorination or oxidation) is most effective under site conditions. For costing purposes, it was assumed that both technologies would be used to enhance the treatment of groundwater contamination.

Compared to Alternative 2, using these two in situ treatment options individually or in combination would most likely reduce the time required for meeting remedial goals. It is expected that in situ oxidation would significantly reduce the concentrations of several prominent VOCs (i.e., PCE, TCE, DCE, and vinyl chloride) and reduce the time required to clean up the groundwater, as compared to Alternative 2.

Two extraction wells would be used at a lower extraction rate of up to 20 gallons per minute (gpm) per well. Because of the use of in situ treatment, it is expected that the extraction wells would be mainly used to contain the plume. Compared to Alternative 2, this would reduce the potential for plume commingling.

If reductive dechlorination is used, about 240 temporary injection points would be used to inject the dechlorination agent. For cost estimating purposes, it was assumed that HRC® (a proprietary reductive dechlorination agent) would be used. If chemical oxidation is used, the oxidizing reagent (e.g., sodium permanganate) would be injected in approximately 160 temporary injection points. Subsequent injections may be needed for successful treatment. Implementation would temporarily disturb traffic on Rayo Avenue and other activities on site and off site, and would require special permits and coordination with the city of South Gate.

Containment Components

Treated water could be reinjected into the groundwater aquifer or discharged to a POTW. The purpose of the limited extraction/treatment system would be to contain further plume migration, minimize potential mixing with other VOC plumes, and clean up residual VOC concentrations to meet the remedial action goals.

Monitoring Components

Similar to Alternative 2, groundwater monitoring will be used to gauge the success of the remedial action. Depending on the rate of contaminant reduction, monitoring may become the only action at Cooper Drum. Monitored natural attenuation could be employed if it can be demonstrated that contaminant concentrations in the groundwater plume have stabilized at reduced concentrations. The estimated cost for this alternative is based on a project duration of 20 years.

Required O&M

O&M activities for VOC treatment using extraction systems and the liquid GAC treatment facilities are the same as for Alternative 2. There is no O&M associated with in situ treatment.

Expected Outcomes

The contaminated groundwater under Cooper Drum is semi-confined in the upper aquifer. Implementation of groundwater Alternative 4 would remove VOC contamination above drinking water standards in the shallow aquifer and would protect the existing beneficial use of the currently uncontaminated deeper aquifers.

9.2.4 Groundwater Alternative 6 - In-Well Air Stripping with Groundwater Circulation Wells

Treatment Components

Alternative 6 applies a physical treatment technology through in situ treatment of VOCs in groundwater. It consists of installing an estimated 34 groundwater circulation wells (GCWs) within the groundwater plume down to 100 feet below the surface. The GCWs are used to achieve in-well air stripping by injecting air into the bottom of the well. This process promotes the circulation of groundwater through the well. Air rises through the groundwater and "strips" (removes) the VOC contaminants. The contaminated vapor is then passed through an aboveground treatment system that uses GAC to remove the VOCs. The treated vapor, from which VOCs have been removed, is discharged to the air.

Due to the uncertainty regarding the effectiveness of using GCWs at Cooper Drum, a treatability study would be required to measure the effectiveness of this technology. The treatability study results could then be used to refine the placement and operation of the GCWs. The advantage of this technology would be the in situ treatment of all the groundwater contaminants without the need to extract, treat, and discharge any groundwater. The main disadvantages are the high potential for scale buildup and biofouling in the underground wells and treatment system and the reliance of the technology on the formation of groundwater circulation zones to effectively capture and treat contamination.

Operation and Maintenance Components

Operation and maintenance of the GCWs underground could be difficult and costly, since there is a high potential for scaling and biofouling inside the GCWs. O&M cost estimates are higher for this alternative as compared to the others.

Monitoring Components

Costs associated with this alternative are based on a project duration of 20 years. These costs could be substantially lower or higher depending on the results of a pilot-scale test, which would indicate the number of wells that would be needed to reach remedial action goals. Sampling of the groundwater monitoring wells would occur at the same frequency as Alternatives 2 and 4.

Required O&M

O&M activities for VOC treatment are related to upkeep of the GCWs and the closed loop treatment systems, including controls and communications systems, mechanical components (e.g., blowers, flow meters, heat exchanger, valves, connections), disposal of spent GAC and recharging of the GAC vessels, pipeline maintenance, prevention and treatment of scale buildup inside pipelines and pipeline components, groundwater circulation well maintenace (may include acid dripping to prevent scale buildup), monitoring well maintenace, grounds upkeep, and reporting of spills, uncontrolled emissions, or other anomalous occurrences.

Expected Outcomes

The contaminated groundwater under Cooper Drum is semi-confined in the upper aquifer. Implementation of groundwater Alternative 6, if shown to be effective in treatability studies during the RD, would remove VOC contamination above drinking water standards in the shallow aquifer and would protect the existing beneficial use of the currently uncontaminated deeper aquifers.

9.3 Common Elements and Distinguishing Features of Each Alternative

Common elements to soil Alternatives 2 and 3 include:

- Reduction of volume and mobility of the VOCs in the soil.
- Use of DPE for treating VOC contamination in soil and groundwater.
- Implementation of institutional controls, however, under Alternative 3 would only need to be in place if non-VOC contamination beneath structures remains on site.
- Attainment of ARARs.

The distinguishing element of Alternative 3 is the inclusion of excavation for removal of shallow soil contaminated with non-VOCs. Alternative 3 is more reliable in the long term because most, if not all, of the non-VOC contamination will be permanently removed off site. Any residual contamination will be in inaccessible areas beneath existing structures and not a health hazard for above ground activities. Subsurface activities would be restricted by implementing institutional controls. The excavation activities under Alternative 3 are likely to disrupt ongoing site operations for over two months.

Common elements to groundwater Alternatives 2, 4, and 6 include:

- Reduced volume and mobility of the VOCs in groundwater.
- Use of GAC for treatment of VOCs.
- Alternatives 2 and 4 have reinjection or discharge to the local publicly owned treatment works (POTW) as groundwater disposal options.
- Attainment of ARARs.

The distinguishing elements include:

- Alternative 2 uses only ex situ physical treatment.
- Alternative 4 uses lower extraction rates compared to Alternative 2.
- Alternative 4 uses both ex situ physical and in situ chemical treatment.
- Alternative 6 used only in situ physical treatment. Construction of 34 GCWs and the aboveground treatment facilities in Alternative 6 is expected to take longer than construction activities associated with alternatives 2 and 4.
- Implementation of Alternatives 4 and 6 would entail evaluation of the in situ treatment in pilot-scale treatability studies.

- Implementation of Alternatives 2 and 4 is expected to provide better groundwater plume control and containment, resulting in more long term reliability.

Table 9-1 summarizes the cost, number of extraction and injection wells, treatment flows, and number of years to achieve RAOs for the soil and groundwater alternatives.

Table 9-1
Summary of General Comparison Information for Each Alternative

Alternative	Media	20 Year Present Value Cost ($million)	Number of Extraction Wells	Total Groundwater Treatment Flow (gpm)	Number of Reinjection Wells	Estimated Time to Achieve RAO (years)
Soil Alternative 2	soil	1.28	3	9 (150 scfm for soil vapor)	0	5-20 [a]
Soil Alternative 3	soil	2.77	3	9 (150 scfm for soil vapor)	0	5 [b]
Groundwater Alternative 2	groundwater	3.53 to 4.08 [c]	3	99	3	20
Groundwater Alternative 4	groundwater	5.36	2	40	1	up to 20 [d]
Groundwater Alternative 6	groundwater	6.59	34	0	0	20

a Based on institutional controls to eliminate exposure pathways from non-VOC contaminated soil.
b Based on excavation and off-site disposal to eliminate exposure pathways from non-VOC contaminated soil.
c The cost range is associated with different discharge options.
d Remediation may be expedited compared to Groundwater Alternative 2 because of the addition of in situ chemical treatment.

10.0 Comparative Analysis of Alternatives

In accordance with the NCP, the soil and groundwater alternatives were evaluated by the EPA using the nine criteria described in Section 121(b) of CERCLA. For an alternative to be an acceptable remedy it must, at a minimum, satisfy the statutory requirements of two threshold criteria: 1) Overall Protection of Human Health and the Environment, and 2) Compliance with Applicable or Relevant and Appropriate Requirements. “No Action” (Alternative 1) for soil and groundwater is the only retained alternative that does not satisfy these threshold criteria. Therefore, this alternative will not be further evaluated in the comparative analysis.

In addition to the discussion in the following paragraphs, the comparative analysis of soil Alternatives 2 and 3, and groundwater Alternatives 2, 4, and 6 are summarized in Table 10-1.

10.1 Overall Protection of Human Health and the Environment

This criterion addresses whether each alternative provides adequate protection of human health and the environment and describes how health risks are eliminated, reduced, or controlled, through treatment, engineering controls, and/or institutional controls.

10.1.1 Soil Alternatives

Alternatives 2 and 3 are protective of human health and the environment. VOC contamination will be treated to meet remedial action goals. Institutional controls will prevent exposure to non-VOC contamination remaining in the subsurface. Existing pavement maintenance is necessary to ensure total protectiveness and prevent exposing individuals to existing contamination. Alternative 3 would provide additional protection from possible exposure to non-VOCs by removing contaminated soil above action levels from Cooper Drum.

Table 10-1 Comparative Analysis of Soil and Groundwater Remedial Action Alternatives With Respect to CERCLA Criteria					
Criterion	**Soil Alternative 2**	**Soil Alternative 3 (Selected Remedy)**	**Groundwater Alternative 2**	**Groundwater Alternative 4 (Selected Remedy)**	**Groundwater Alternative 6**
Overall protectiveness	Protective	Protective	Protective	Protective	Protective
Compliance with ARARs	Does not comply with ARARs for non-VOCs	Better; complies with ARARs for VOCs and non-VOCs	Complies with ARARs	Complies with ARARs	Complies with ARARs provided recirculation zones are formed.
Long-term effectiveness and permanence	Effective for VOCs. Effective for non-VOCs while institutional controls are in place and pavement is maintained in good condition	More effective for non-VOCs; shallow and accessible non-VOC contamination will be permanently removed	Effective; groundwater with COC levels above action levels will be treated	Potentially more effective; supplemental in situ treatment may expedite cleanup	Stand alone in situ technology may be effective if recirculation zones are formed and scaling is prevented
Reduction in toxicity, mobility, or volume through treatment	Does not reduce toxicity or volume of non-VOCs	Better for non-VOCs; volume of non-VOC contamination will be reduced	Reduces volume of COCs	Potentially better; also reduces toxicity of COCs in place	Reduces volume of COCs if recirculation zones are formed
Short-term effectiveness	VOC treatment within 2 years. Well construction must not create conduits for vertical migration of COCs. Soil gas emissions must be effectively controlled	Same as Alternative 2. Fugitive dust and soil gas emissions during excavation and transport must be controlled. Workers must be properly attired	Appreciable short-term results are not expected. Potential commingling with off-site plumes. Well construction must not create conduits for vertical migration of COCs	Better; supplemental in situ treatment may expedite cleanup. Lower potential for plume commingling.	Some increase in VOC levels may be observed initially. Well construction must not create conduits for vertical migration of COCs
Implementability	Construction will temporarily disturb surface structures and activities. Transport of waste off site is required. Institutional controls will require that an appropriate entitiy (e.g. DTSC) be willing to accept and enforce the restrictive covenant to be executed by the property owners.	Same as Alternative 2, plus transport will also be required for excavation and off-site disposal of contaminated soil	Anti-degradation policies may apply if treated water is reinjected. Construction activities will temporarily disturb surface structures and some activities at Cooper Drum. Waste discharge conditions from the RWQCB are required	Same as Alternative 2, plus numerous (temporary) injection points will disturb surface structures, activities, and traffic on- and off-site. Waste discharge conditions will be required for injection of chemicals and treated water	Worse; installation of numerous (permanent) wells and associated piping will disturb surface structures and activities both on- and off-site. An above-ground treatment plant with sound-proof enclosure is required. Waste discharge conditions are required
Present worth capital cost ($1,000)	$460	$1,946	$447 [a] $638 [b]	$2,451	$2,734
Annual O&M cost ($1,000)	$47	$47	$220 [a] $247 [b]	$208	$261
Total present worth cost ($1,000) [c]	$1,284	$2,770	$3,529 [a] $4,077 [b]	$5,364	$6,589

[a] Treated water discharged to POTW.
[b] Treated water reinjected into aquifer.
[c] Present worth cost estimates are based on 2001 dollars and were calculated using a 7% discount rate. Remedial action start year was assumed to be 2003, and the duration of remedial action was set to 20 years. The cost of 3 years of post-remedial action compliance monitoring was included for all action alternatives.

ARAR applicable or relevant and appropriate requirements
COC chemical of concern
O&M operation and maintenance
VOC volatile organic compound

10.1.2 Groundwater Alternatives

With regards to treatment of COCs above action levels, Alternatives 2 through 6 would be protective. Groundwater VOC contamination above remedial action goal levels would be extracted or stripped and treated using GAC. The health risk from any remaining contamination would be negligible.

Alternatives 3 through 5 which include use of in situ chemical treatment in addition to ex situ treatment are expected to expedite the destruction of hazardous VOCs in the groundwater.

Regarding plume containment, Alternatives 2 and 4 which include use of extraction, treatment, and reinjection of groundwater, or "pump-and-treat" response action, would be more effective than Alternative 6 which is strictly an in situ response action.

10.2 Compliance with Applicable or Relevant and Appropriate Requirements

Section 121(d) of CERCLA and NCP §300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate federal and state requirements, standards, criteria, and limitations which are collectively referred to as ARARs, unless such ARARs are waived under CERCLA §121(d)(4).

Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be applicable. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental, state environmental, or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified in a timely manner and are more stringent than federal requirements may be relevant and appropriate.

Compliance with ARARs addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes or provides a basis for invoking a waiver. None of the soil or groundwater alternatives required a waiver for ARARs.

Soil Alternatives 2 and 3 have common ARARs associated with the DPE, GAC, and institutional controls. The use of DPE for VOCs in soil includes compliance with emission standards for volatile organics. Soil Alternative 2 would depend on institutional controls to eliminate the residential exposure pathway for non-VOC soil contaminants. Soil Alternative 3 includes the added component of excavation and off-site disposal of non-VOC-contaminated soil to protect human health. Acquisition of permits would not be necessary for on-site treatment operations.

Groundwater Alternatives 2, 4, and 6 would meet all of the ARARs. These groundwater alternatives rely on treatment to reduce toxicity and mobility of the VOCs in groundwater. Groundwater Alternatives 2 and 4 would discharge treated groundwater to the aquifer or the local POTW. A permit would be necessary for off-site discharge of treated water to the POTW; treatment would comply with the local sewer discharge limitations and fee requirements.

All of the ARARs for the selected remedy are presented in the Statutory Determinations (40 CFR §300.430(f)(5)(ii)(B)).

10.3 Long-Term Effectiveness and Permanence

This criterion refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup levels have been met. This criterion includes the consideration of residual risk that will remain on-site following remediation and the adequacy and reliability of controls.

10.3.1 Soil Alternatives

With regards to VOCs, Alternatives 2 and 3 would provide long-term effectiveness because the remediation would continue until VOC levels fall below remedial action goal levels. Once remedial action goals are achieved, compliance monitoring will provide an early warning if contamination rebound is observed. Dual phase extraction is recognized as an enhancement to the "presumptive remedy" of SVE which implies that the process has been shown to be widely effective and permanent.

With regards to non-VOCs, institutional controls under Alternative 2 would be effective so long as the administrative restrictions and access controls remain in place, and the pavement (capping) is maintained. However, contaminated soil would remain as a potential source of groundwater contamination. Alternative 3 (the selected remedy) would be more effective because, where possible, soil contaminated with non-VOCs above action levels would be permanently removed from Cooper Drum, thus reducing potential health risks.

Five-year reviews would be necessary to evaluate the effectiveness of either alternative because hazardous substances would remain in the subsurface where excavation is not deemed feasible.

10.3.2 Groundwater Alternatives

Over the long-term, Alternatives 2 and 4 would provide an effective means of controlling the migration of the existing contaminant plume in the Gaspur Aquifer. The contamination in the groundwater would be permanently reduced because remedial action would continue until RAOs were met. Once RAOs are achieved, compliance monitoring would provide an early warning if contamination rebound were observed. (If treated water is reinjected, care must be taken to prevent fouling and scaling of the injection wells over time.)

The long-term effectiveness of Alternative 6 is uncertain since it is dependent upon successful implementation of the groundwater circulation wells and formation of the recirculation cells under site conditions. In addition, in-well scale formation must be avoided if this alternative is to be effective. Compared to Alternatives 2 and 4, Alternative 6 is the only remedy that does not include a pump-and-treat component and utilizes only in situ technology. Plume control will be possible only if recirculation cells are effectively established. Additional wells may be required downgradient of the plume for added plume control.

10.4 Reduction of Toxicity, Mobility, or Volume Through Treatment

This CERCLA criterion refers to the anticipated performance of the treatment technologies that may be included as part of a remedy. Remedial actions that use active treatment to permanently and significantly reduce the toxicity, mobility, and volume of contamination satisfy this criterion.

10.4.1 Soil Alternatives

Through active treatment, Alternatives 2 and 3 would equally reduce the toxicity, mobility, and volume of VOC contamination in soil. VOCs above action levels would be extracted from the soil and adsorbed onto GAC. The VOCs would be permanently destroyed in the likely event that the spent carbon is eventually reactivated by the carbon vendor.

Alternative 3 (the selected remedy) is more effective with respect to this CERCLA criterion, however. By removing non-VOC contamination above action levels in accessible areas, Alternative 3 would permanently reduce the volume of non-VOC contamination in Cooper Drum subsurface. The excavated soil would be disposed in a landfill, where the contaminants would be actively destroyed or, at a minimum, encapsulated, resulting in reduced mobility.

10.4.2 Groundwater Alternatives

Alternatives 2 and 4 would reduce the toxicity, mobility, and volume of COCs through active treatment (adsorption onto liquid-phase GAC). The spent GAC would be removed from Cooper Drum and likely reactivated, resulting in eventual destruction of the COCs.

In addition to the pump-and-treat action of Alternative 2, Alternatives 4 includes the use of in situ technologies which, if effective, would chemically react with the COCs, thus reducing the volume and toxicity of these compounds in the groundwater. This would reduce the contamination load on the GAC treatment system.

With regards to non-COCs which may be present at high background concentrations (e.g., arsenic), discharge to POTW would result in removal of the contaminants from the Cooper Drum subsurface, whereas reinjection of the treated groundwater would not.

Alternative 6 would reduce the toxicity, mobility, and volume of COCs in groundwater, by stripping the VOCs, followed by adsorption of the VOCs onto GAC. However, the effectiveness of this remedy would be undermined if the groundwater circulation wells produced scale or if recirculation zones did not form effectively. Because of the proven pump-and-treat component, Alternatives 2 and 4 are expected to be more effective in extracting and permanently removing VOCs from the groundwater.

10.5 Short-Term Effectiveness

This criterion addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community, and the environment during construction and operation of the remedy until cleanup levels are achieved.

10.5.1 Soil Alternatives

Remedial action goals for VOCs may be achieved within two years of startup if either Alternative 2 or 3 is implemented. However, periods of system shutdown and contamination rebound, followed by additional extraction, may lengthen the duration of remedial action. Care must be taken during construction of the extraction and vapor monitoring wells and conveyance piping to minimize/prevent soil gas emissions. The vapor-phase GAC must be designed so as to create no air emissions. Furthermore, well construction must be completed so as not to create a “conduit” through which contamination can migrate vertically.

Both Alternatives 2 and 3 include use of institutional controls to a different extent as a means of preventing exposure to the non-VOC contamination in soil. These controls are expected to remain in place until subsurface contamination is removed or otherwise no longer deemed hazardous.

If Alternative 3 is implemented, excavation and disposal of non-VOC contaminated soil above action levels is expected to be completed in a matter of months. Care must be taken to control fugitive dust and/or soil gas emissions during soil excavation and transport activities. Workers would be required to wear appropriate levels of protection to avoid exposure during excavation and transport activities.

10.5.2 Groundwater Alternatives

Appreciable short-term results (e.g., in less than a year) are generally not associated with the extraction/GAC treatment component of Alternatives 2 and 4. However, some reduction in mass and mobility of contamination is expected as groundwater is removed and treated. With regards to negative short-term effects, well construction must be completed so as not to create a “conduit” through which contamination can migrate vertically. Since liquid-phase GAC would be used, no air emissions are associated with use of this alternative.

Because of the higher extraction rates, there is a higher potential for commingling of plumes on site and off site if Alternative 2 is implemented.

Implementation of Alternative 4 may entail use of an oxidizing reagent for in situ oxidation of groundwater COCs. Oxidation of most COCs is expected to be rapid and effective. During application, skin contact with the oxidizing solution, and inhalation of any dust or vapors should be avoided. Workers should use protective gear and clothing. In some cases, oxidation may temporarily inhibit growth of anaerobic bacteria in the groundwater, which in turn may adversely affect biodegradation of the contaminants. Also, in the short-term, because of increased mobility, the concentrations of some metals may increase. The concentrations would eventually return to background concentrations. Well construction must be completed so as not to create a “conduit” through which contamination can migrate vertically. The pump-and-treat component of Alternative 4 must be designed so as to provide adequate hydrologic control of the injected oxidizing solution.

In situ reductive dechlorination is a component of Alternatives 4. If HRC® is used and is effective, dechlorination of COCs should occur within 6 months of application. Application may be completed over a 12-week period. In situ reductive dechlorination, by definition, relies on biodegradation processes for breakdown of the COCs. In the short-term, some increase in concentrations of TCE breakdown byproducts (e.g., cis, 1-2, DCE and VC) may occur. If necessary, under Alternative 4, chemical oxidation of these compounds would occur fairly quickly if in situ oxidation is used following HRC® application.

If groundwater recirculation zones are formed effectively upon implementation of Alternative 6, some short-term removal of VOCs may be expected. Initially, some increase in VOC concentrations may be noticed, as VOCs volatilize and desorb from the soil formation. Groundwater circulation well construction must be completed so as not to create a conduit through which contamination can migrate vertically. The vapor phase GAC treatment must be designed so as to eliminate the potential for air emissions.

10.6 Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

10.6.1 Soil Alternatives

Both Alternatives 2 and 3 are technically feasible and implementable. All materials and services needed for implementation are readily and commercially available.

With regards to VOC treatment, some interference with ongoing business activities at Cooper Drum is expected because implementation of the extraction/DPE system would result in the installation of extraction wells and related conveyance piping, and the construction of an aboveground treatment plant. A permit would be required for off-site discharge of the extracted water to the POTW. Implementation would result in disruption of roads and surface structures to accommodate the aboveground and buried systems. Operation and maintenance of the system would include cleaning and replacement of well components, disposal and replacement of activated carbon, and maintenance of pumps, controls, and other equipment.

With regards to non-VOCs in soil, implementation of institutional controls will require cooperation by the state (DTSC) or local government, since some appropriate entity must agree to accept and enforce the restrictive covenant. Both Alternative 2 and Alternative 3 rely to some extent on institutional controls.

The excavation component of Alternative 3 is implementable and technically feasible. However, soil excavation would result in disruption of surface structures (pavement, etc.) over the short-term. Excavation would not be implementable or feasible for areas where contamination is found to be too deep or under existing structures. Transport of the excavated soil to an off-site landfill would be required.

10.6.2 Groundwater Alternatives

Implementation of all groundwater alternatives is technically feasible and all materials and services needed for implementation are readily and commercially available.

The extraction/treatment component of Alternatives 2 and 4 would result in the installation of wells and related conveyance piping, and the construction of an aboveground treatment plant. Coordination with the City of South Gate would be required to install treatment system components which may disrupt traffic. Additionally, because non-COCs would not be treated below MCLs, reinjection of treated water would require coordination with the RWQCB. EPA's position is that reinjection of water with non-COCs at background levels would be acceptable, so long as the treated water is reinjected back into the same aquifer, not far from where it was extracted. Discharge of groundwater to the POTW may be acceptable if reinjection is not feasible or the discharge volume is small (e.g., in the case of Alternative 4). Discharge limits would have to comply with off-site permit requirements in either case. Operation and maintenance of the system would include cleaning and replacement of well components, disposal and replacement of activated carbon, and maintenance of pumps, controls, and other equipment.

Implementation of Alternative 4 would additionally entail injecting a reagent into many temporary injection points located in areas of activity. For technical feasibility, care must be taken to inject the reagent such that there is adequate overlap of the radii of influence between consecutive injection points. This frequency of injection points would cause disruption of site activities and traffic, and impact surface structures. Coordination with City of South Gate officials would be required. Discharge conditions from the RWQCB would be required to allow for injection of the reagents and water into the subsurface.

Some interference with ongoing business activities at Cooper Drum is expected with implementation of Alternative 6 because it would result in the installation of numerous permanent groundwater circulation wells and related conveyance piping both on site and off site, and the construction of an aboveground treatment plant on site. Coordination with the City of South Gate would be required to install treatment system components which may disrupt traffic. Any water discharges would need to be coordinated with the appropriate agencies. A soundproof building would be required to house the blowers. The most difficulty could be from having to keep the treatment system, the wells, and the conveyance piping free of scale. Operation and maintenance of the system would also include cleaning and replacement of well components, disposal and replacement of activated carbon, and maintenance of pumps, controls, and other equipment.

10.7 Cost

Table 10-1 lists the capital, annual O&M, and total present worth cost estimates for the soil and groundwater alternatives.

10.7.1 Soil Alternatives

Because of the added capital cost associated with the excavation component, the total present worth cost for Alternative 3 ($2.77 million) is more than twice that of Alternative 2 ($1.29 million). However, the difference in cost will be less if the actual volume of excavated soil is less than assumed, or if some of the excavated uncontaminated soil can be used for refill or can be transported to a Class II landfill.

The annual O&M cost for both alternatives is equivalent because these costs are associated with the operation and maintenance of the extraction/treatment systems and implementation of the institutional controls.

10.7.2 Groundwater Alternatives

The estimated present worth costs for the groundwater alternatives, not including the No Action alternative, range from a minimum of $3.53 million for Alternative 2 (when using POTW discharge) to $6.59 million for Alternative 6. All costs are based on a 20-year duration for remedial action.

Although the projected cost for implementing Alternative 4 (the selected remedy) is shown to be higher than that for Alternative 2, the following items should be taken into perspective for a fair comparison:

1) The use of in situ treatment in addition to the pump-and-treat action may expedite cleanup, to such a level that the overall cost of implementation of Alternative 4 is less than Alternative 2.

2) It is likely that only one in situ treatment - oxidation or reductive dechlorination, whichever is found to be more effective during treatability studies - will actually be used as part of Alternative 4.

3) The extent of in situ treatment (i.e., amount of material used, number of injection points, and frequency of applications) may be less than projected, such that the implementation cost for Alternative 4 is less than estimated.

Because the pump-and-treat component of Alternative 4 is less extensive than that for Alternative 2, the associated annual O&M costs are expected to be far less.

10.8 State Acceptance

The State of California Department of Toxic Substances Control and the Los Angeles Regional Water Quality Control Board have concurred with EPA’s preference for soil Alternative 3 and groundwater Alternative 4.

10.9 Community Acceptance

During the public comment period for the Proposed Plan, no written comments were received. Questions that were raised at the Public Meeting were addressed by EPA staff. There were no significant issues or objections directed toward the selected remedy. EPA believes that the selected remedy addresses the community concerns that were identified during community interviews. The main concern was that the selected remedy should not include incineration of contaminants, which could further impact air quality conditions. The selected remedies for soil and groundwater do not include incineration of contaminants and will not adversely impact air quality; therefore, community concerns have been addressed.

11.0 Principal Threat Wastes

The NCP establishes EPA's expectation that treatment be used to address the principal threats posed by a site wherever practical. The principal threat concept applies to the source materials at a Superfund site that are highly mobile and cannot be reliably controlled in place, or would present a significant risk to human health or the environment should exposure occur. A source material is material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to groundwater, surface water, or air or act as a source for direct exposure.

Although treatment will be applied to the VOC contaminated soil and groundwater, there are no principal threats at Cooper Drum. The VOC soil contaminants are mobile and act as a potential threat to groundwater but are low in concentration. The non-VOC soil contaminants pose a risk to human health but are not mobile and are characterized by relatively low concentrations within a confined area. Groundwater contamination at Cooper Drum is at low concentrations and not considered to be a source material. NAPLs have not been detected in the groundwater.

12.0 Selected Remedy

The remedial action for Cooper Drum addresses contaminated soil and groundwater. To remove the potential threat to human health, the selected remedy for soil (Alternative 3) uses dual phase extraction (DPE) for treatment of volatile organic compounds (VOCs) in soil. Other non-VOC soil contaminants, including semi-volatile organic compounds (SVOCs), PCBs, and lead, will be excavated for disposal. Institutional controls will be implemented to prevent exposure to soil contaminants where excavation is not feasible.

The cleanup strategy for groundwater contaminated with VOCs (Alternative 4) will use a combination of methods to achieve remedial goals and to restore the potential beneficial use of the aquifer as a drinking water source.

An ex situ treatment component, consisting of a groundwater extraction and treatment system, will be used for containment and remediation. This ex-situ treatment component will utilize presumptive technologies identified in Directive 9283.1-12 from EPA's Office of Solid Waste and Emergency Response (OSWER). Since the COCs in groundwater are volatile, one of the presumptive technologies (GAC) will be used for treating aqueous contaminants in the extracted ground water.

In situ chemical treatment - reductive dechlorination and/or oxidation - will also be used to enhance the treatment of VOCs in groundwater and to minimize the need for extraction and ex situ treatment.

The actual technologies and sequence of technologies used will be determined during remedial design (RD). Final selection of these technologies will be based on the outcome of treatability studies to be performed during the RD.

The EPA believes the selected remedy for Cooper Drum meets the threshold criteria and provides the best balance of tradeoffs among the alternatives considered. The EPA expects the selected remedy to satisfy the statutory requirements of CERCLA Section 121(b): 1) protection of human health and the environment: 2) compliance with ARARs; 3) cost effectiveness; 4) use of permanent solutions and alternative treatment technologies to the maximum extent practicable; and 5) use of treatment as a principle component.

12.1 Summary of the Rationale for the Selected Remedy

The principal factors considered in choosing the selected remedy for soil are:

1) VOCs in soil are mobile but are low level threats to human health since they exist at relatively low concentrations and can be contained;

2) DPE, an enhancement of the presumptive remedy of soil vapor extraction (SVE), can be used to simultaneously treat the VOCs in the soil and in the perched aquifer which starts at about 35 ft below ground surface (bgs);

3) Excavation and disposal of shallow soil will be effective because non-VOCs in shallow soil are not mobile and are localized in a confined area;

4) Use of institutional controls will eliminate/minimize the potential for exposure to any residual subsurface contamination; and

5) The selected remedy is protective of human health and environment and complies with ARARs for VOCs and non-VOCs.

The principal factors considered in choosing the selected remedy for groundwater are:

1) There is no source material or non-aqueous phase liquids (NAPLs) in the groundwater constituting a principal threat;

2) Low level extraction provides an effective means of minimizing migration of the leading edge of the contaminant plume, without further commingling of on- and off-site plumes;

3) Reinjection of a portion of the treated ground water will enhance recovery of contaminants from the aquifer and will reduce the plume commingling potential;

4) Supplemental in situ chemical treatment may expedite cleanup and reduce volume and toxicity of contaminants in place; and

5) Depending on the success of the in situ chemical treatment, monitoring may become the only action needed at Cooper Drum within 5 to 10 years if it can be demonstrated that contaminant concentrations in the groundwater plume have stabilized at reduced concentrations.

12.2 Description of the Selected Remedy

<u>Selected Remedy for Soil</u>

The selected remedy for soil is Alternative 3. This alternative uses DPE to treat VOCs in soil, excavation and off-site disposal to remove non-VOCs in shallow soil, and institutional controls to limit future use of Cooper Drum in areas where soil excavation is not feasible. The components of the selected remedy are as follows:

- In the former hard wash area (HWA), extract VOC contaminated soil vapor and groundwater simultaneously using dual phase extraction (DPE) technology. Treat the extracted soil vapor and groundwater using vapor and liquid phase carbon in vessels at an on-site treatment plant.

- After removal of VOCs, discharge the treated soil vapor into the air. The treated water will be reinjected into the aquifer or discharged to the public sewer system operated by the Los Angeles County Sanitation District.

The total duration of the DPE remedial action is projected to be five years. Actual operation of the DPE system is estimated to be two years. It is assumed that vapor monitoring wells and groundwater extraction wells would continue to be sampled for at least three more years to ensure remedial action goals have been met.

- Conduct additional soil gas sampling in the drum processing area (DPA) during the remedial design (RD) phase to further identify the extent of VOC contamination and the need for remediation using dual phase extraction in this area.

- In the HWA and DPA, excavate an estimated 2,700 tons of non-VOC contaminated shallow soil (estimated down to five feet in depth) for disposal at an approved off-site facility. Use clean soil to backfill excavated areas.

- Conduct additional soil sampling in the DPA and HWA during the RD phase to further define the extent of non-VOC contamination and the need for remediation beyond the estimated 2,700 tons of soil.

- Implement institutional controls for soil contaminated with non-VOCs in areas where excavation is not feasible, such as under existing structures, by requiring the execution and recording of a restrictive covenant which will limit activities that might expose the subsurface and would prevent future use, including residential, hospital, day care center and school uses, as long as contaminated soil remains on site.

The objectives of institutional controls for Cooper Drum are:

1) To provide notification to all potential future site users of the presence of hazardous materials (soil contaminated with non-VOCs) in those areas of Cooper Drum where excavation was not feasible.

2) To minimize the potential for exposure of future site users to contaminated soils left on site after completion of this Remedial Action.

3) To prevent disturbance of contaminated soils left on site after completion of this Remedial Action by drilling or construction in contaminated areas.

4) To expressly prohibit residential land use on any part of Cooper Drum and limit future uses of Cooper Drum to commercial and industrial activities unless, and until all contaminated soil left on Site after the completion of this Remedial Action has been treated to safe residential levels or excavated and removed from Cooper Drum.

To achieve these objectives, EPA intends to require the legal owners of Cooper Drum to execute and record a restrictive covenant addressing these objectives. The restrictive covenant shall run with the land and be enforceable under California law (including California Civil Code Section 1471) against all present and future property owners and tenants. EPA and/or the State of California DTSC (the State) shall oversee compliance with the use restrictions.

The land use restrictions in the restrictive covenant shall include compliance with all the following provisions:

a) Construction not approved by EPA or the State that impacts contaminated soils left in place shall not occur.

b) No new openings shall be made in floor slabs in buildings or structures overlying contaminated soils left in place without the prior written approval of EPA or the State.

c) The integrity of existing foundations shall be maintained in areas underlain by contaminated soils left in place. All cracks or other damage in such foundations shall be reported to EPA or the State.

d) Present and future owners of Cooper Drum or any portion thereof shall disclose all institutional controls to all tenants on the property.

e) Present and future owners of Cooper Drum or any portion thereof shall inform EPA or the State of the identities of all tenants on the property.

f) Contaminated soils left on site shall not be excavated without the written approval and supervision of EPA or the State.

g) No portion of Cooper Drum shall be used or redeveloped for residential use, used as a hospital, day care center or school unless and until contaminated soils left on site have been treated to safe levels for such uses or excavated and removed from Cooper Drum as certified by EPA or the State. When and if, through excavation of soils or otherwise, the entire site is rendered safe for unrestricted use, EPA and/or the State will consider removal of the restrictive covenant from the chain of title to the property comprising Cooper Drum.

Selected Remedy for Groundwater

The selected remedy is groundwater Alternative 4. This alternative consists of extracting VOC-contaminated groundwater and treating it with liquid-phase activated carbon. In situ chemical treatment - reductive dechlorination or chemical oxidation - would be used to expedite and enhance treatment, and to reduce the volume of extracted water. The various components of the selected remedy are:

- Extract groundwater contaminated with VOCs and treat it using liquid-phase activated carbon in vessels at an on-site treatment system. Containment will be provided at the downgradient extent of contamination.

- The treated water will be reinjected into the contaminated groundwater aquifer or discharged to the public sewer system operated by the Los Angeles County Sanitation District. Reinjection will reduce the intrusion of and the potential for mixing with other off-site VOC plumes.

- Use in situ chemical treatment, either reductive dechlorination or chemical oxidation, to enhance remediation of VOC-contaminated groundwater. During the remedial design (RD) phase, conduct treatability studies to evaluate both methods and determine which works best under site conditions. Data obtained from pilot studies will also be used to determine the specific number and placement of in situ injection points.

- Conduct additional groundwater sampling during the RD phase to further define the downgradient extent of the VOC contamination.

- Conduct groundwater monitoring to evaluate the effectiveness of the remedy, the location of the plume, and that remediation goals have been met.

Continue groundwater monitoring for a period of three years after the monitoring demonstrates that remediation goals have been met. The projected time to reach remedial action goals is 20 years. However, the actual time required for cleanup may be reduced if the in situ chemical treatment is effective. Depending on the success of in situ chemical treatment, monitoring may become the only action needed at Cooper Drum within 5-10 years. For example, in situ chemical treatment may provide a relatively fast reduction of the contaminant mass in the ground water plume. This mass reduction could lead to stabilization of low contaminant concentrations to the point that containment with extraction wells may no longer be necessary.

12.3 Summary of the Estimated Remedy Costs

The estimated costs for the selected remedy are presented in four tables. Tables 12-1 and 12-2 are cost estimate summary tables for the selected remedy for soil and groundwater, respectively. These tables present the subtotal capital and O&M costs associated with different components of the selected remedy, the subtotal discounted costs, and the total present worth costs for implementation of the remedy. Tables 12-3 and 12-4 list the annual and total present worth cost estimates for the selected remedy for soil and groundwater, respectively.

Uncertainty in Cost Estimates

All assumptions used in calculating the cost estimates are listed in the table footnotes and as follows:

- A remedial action start date of 2003 was assumed in the cost calculations; however, actual start date may be later.
- Overall duration of remedial action was assumed to be 20 years.
- Undiscounted costs were estimated in 2001 dollars.
- A 7% discount rate was used in the present worth analysis.

The major sources of uncertainty in the cost estimates include:

- The treatment technologies: the actual technologies and sequence of technologies used will be determined during remedial design (RD). Final selection of these technologies will be based on the outcome of treatability studies to be performed during the RD.
- The amount of soil that will be excavated and disposed to landfill.
- The number of extraction and injection wells.
- The number of injection points and the amount of chemical reagent needed.
- The amount of water that will be discharged to POTW.
- The extent and duration of monitoring.
- The duration of remedial action.

The cost summary tables are based on the best available information regarding the anticipated scope of the remedial action. Changes in the cost elements are likely to occur as a results of the new information and data collected during the remedial design phase. Major changes may be documented in the form of a memorandum to the Administrative Record file, an ESD, or a ROD amendment. The projected cost is based on an order-of-magnitude engineering cost estimate that is expected to be within +50 or -30 percent of the actual project cost.

Table 12-1
Cost Estimate Summary for the Selected Remedy for Soil

Description	Cost
CAPITAL COSTS	
DPE and vapor monitoring well installation [a]	$286,557
GAC treatment system installation	$27,788
Piping installation	$42,940
Institutional controls	**$8,290**
Soil excavation	$308,237
Soil transportation and disposal to Class I landfill	$872,760
Subtotal (Construction)	**$1,546,572**
Subtotal (Discounted) [b]	**$1,414,730**
Bid contingencies (5% of discounted)	$71,000
Scope contingencies (20% of discounted)	$283,000
Engineering Design (5% of total)	$88,000
Bonding and insurance of construction workers (3% of total)	$53,000
Field and laboratory testing during construction (1% of total)	$18,000
Reporting during construction (1% of total)	$18,000
TOTAL CAPITAL COST (Discounted) [b]	**$1,945,730**
OPERATIONS AND MAINTENANCE COSTS	
Extraction wells	$91,646
Treatment system	$34,282
Discharge piping	$53,024
SVE treatment system and well monitoring	$702,488
Institutional controls	$49,580
Subtotal O&M	**$931,020**
Subtotal O&M (Discounted) [b]	**$823,929**
TOTAL PRESENT VALUE	**$2,769,659**

Notes: Undiscounted costs are based on 2001 dollars and were estimated using RACER™, with an accuracy of -30% to +50%. Costs were based on a 20-year overall duration for remedial action (including 2 years of dual phase extraction, 3 years of compliance monitoring, and 20 years of institutional controls).

a Assumed start date for cost estimating purposes is January 2003. Actual start date may be later.
b A 7% discount rate was assumed.

Table 12-2 Cost Estimate Summary	
Description	**Cost**
CAPITAL COSTS	
Reductive dechlorination (2003) [a,b]	$1,333,494
In situ oxidation (2004)	$304,272
Extraction well and piping installation	$119,731
Treatment system facilities	$47,797
Discharge piping	$6,399
Injection well installation	$31,188
Monitoring well installation	$106,433
Subtotal (Construction)	**$1,949,314**
Subtotal (Discounted) [c]	**$1,783,140**
Bid Contingencies (5%)	$89,000
Scope Contingencies (20%)	$357,000
Total Construction	**$2,229,140**
Engineering Design (5% of total)	$111,000
Bonding and insurance of construction workers (3% of total)	$67,000
Field and laboratory testing during construction (1% of total)	$22,000
Reporting during construction (1% of total)	$22,000
Total Capital Cost	**$2,451,140**
OPERATIONS AND MAINTENANCE COSTS	
Extraction wells	$274,231
Treatment system [d]	$460,069
Injection wells	$140,333
Well monitoring	$2,072,990
Treatment system monitoring	$1,841,781
Subtotal O&M	**$4,789,404**
Subtotal O&M (Discounted) [e]	**$2,912,577**
TOTAL PRESENT VALUE	**$5,363,717**

Notes: Undiscounted costs are based on 2001 dollars and were estimated using RACER™, with an accuracy of -30% to +50%. Costs were based on a 20-year duration for remedial action, plus 3 additional years for compliance monitoring.

a For cost estimating purposes, it was assumed that Hydrogen Release Compound (HRC®) would be used.

b A start date of March 2003 was used in the cost calculations. The actual start date may be later.

c A 7% discount rate was assumed.

d The O&M costs include the cost of discharge of half the water to injection wells and the remainder to POTW.

Table 12-3
Present Worth Cost Analysis for the Selected Remedy for Soil

Year [a]	Capital Cost	O&M Cost [b]	Inflation [c]	Discount Rate [d]	Inflation Discounted [e]	Present Worth Cost [f]
0	$1,945,730		Included	Included	Included	$1,945,730
1		$607,995	1.0473	0.8734	0.9148	$556,165
2		$260,526	1.0699	0.8163	0.8734	$227,532
3		$11,420	1.0934	0.7629	0.8341	$9,526
4		$6,947	1.1175	0.7130	0.7968	$5,535
5		$6,947	1.1421	0.6663	0.7610	$5,287
6		$2,479	1.1673	0.6227	0.7269	$1,802
7		$2,479	1.193	0.5820	0.6943	$1,721
8		$2,479	1.2194	0.5439	0.6633	$1,644
9		$2,479	1.2463	0.5083	0.6336	$1,571
10		$2,479	1.2734	0.4751	0.6050	$1,500
11		$2,479	1.3006	0.4440	0.5775	$1,432
12		$2,479	1.3278	0.4150	0.5510	$1,366
13		$2,479	1.3549	0.3878	0.5255	$1,303
14		$2,479	1.3821	0.3624	0.5009	$1,242
15		$2,479	1.4093	0.3387	0.4774	$1,183
16		$2,479	1.4365	0.3166	0.4548	$1,127
17		$2,479	1.4636	0.2959	0.4330	$1,073
18		$2,479	1.4908	0.2765	0.4122	$1,022
19		$2,479	1.518	0.2584	0.3923	$ 972
20		$2,479	1.5451	0.2415	0.3732	$925
Total present worth cost				**$2,769,659**		

Notes: Costs were estimated using RACER™, with an accuracy of -30% to +50%.

a Costs were based on a 20-year duration for remedial action.

b O&M costs associated with treatment and monitoring are included for the first five years of remedial action. The O&M costs for remaining years are associated with institutional controls. These costs may be eliminated if institutional controls are limited to ensuring the subsurface is not disturbed or accessed (i.e., if no pavement repairs are implemented).

c Inflation was accounted for because undiscounted costs were based on 2001 dollars. Assumed start date of remedial action was 1 January 2003 but actual start date may be later.

d A discount rate of 7% was used.

e This value is the product of the inflation rate and the discount rate.

f This value is calculated by multiplying the “inflation discounted” by the O&M cost.

Table 12-4
Present Worth Cost Analysis for the Selected Remedy for Groundwater

Year [a]	Capital Cost	O&M Cost	Inflation [b]	Discount Rate [c]	Inflation Discounted [d]	Present Worth Cost [e]
0	$2,451,140		Included	Included	Included	$2,451,140
1		$ 288,250	1.0473	0.8734	0.9148	$ 263,677
2		$ 243,860	1.0699	0.8163	0.8734	$ 212,977
3		$ 230,336	1.0934	0.7629	0.8341	$ 192,135
4		$ 227,432	1.1175	0.7130	0.7968	$ 181,209
5		$ 230,336	1.1421	0.6663	0.7610	$ 175,292
6		$ 231,789	1.1673	0.6227	0.7269	$ 168,496
7		$ 227,432	1.193	0.5820	0.6943	$ 157,914
8		$ 230,336	1.2194	0.5439	0.6633	$ 152,776
9		$ 227,432	1.2463	0.5083	0.6336	$ 144,091
10		$ 237,596	1.2734	0.4751	0.6050	$ 143,742
11		$ 234,208	1.3006	0.4440	0.5775	$ 135,251
12		$ 227,432	1.3278	0.4150	0.5510	$ 125,313
13		$ 230,336	1.3549	0.3878	0.5255	$ 121,031
14		$ 227,432	1.3821	0.3624	0.5009	$ 113,929
15		$ 230,336	1.4093	0.3387	0.4774	$ 109,957
16		$ 231,789	1.4365	0.3166	0.4548	$ 105,408
17		$ 227,432	1.4636	0.2959	0.4330	$ 98,484
18		$ 230,336	1.4908	0.2765	0.4122	$ 94,949
19		$ 227,432	1.518	0.2584	0.3923	$ 89,217
20		$ 237,596	1.5451	0.2415	0.3732	$ 88,662
21		$ 72,845	1.5723	0.2257	0.3549	$ 25,852
22		$ 16,636	1.5995	0.2109	0.3374	$ 5,613
23		$ 16,636	1.6267	0.1971	0.3207	$ 5,335
24		$ 4,159	1.6538	0.1842	0.3047	$ 1,267
Total present worth cost				**$5,363,717**		

Notes: Costs were estimated using RACER™, with an accuracy of -30% to +50%.

a Costs were based on a 20-year duration for remedial action, plus three years of compliance monitoring. Assumed start date of remedial action was 1 March 2003 but actual start date may be later.
b Inflation was accounted for because undiscounted costs were based on 2001 dollars.
c A discount rate of 7% was used.
d This value is the product of the inflation rate and the discount rate.
e This value is calculated by multiplying the “inflation discounted” by the cost.

12.4 Expected Outcome of the Selected Remedy

The selected remedy for soil is expected to remove existing VOC contamination to levels that prevent impact to the aquifer below ground and the indoor air quality above ground. The soil remedy will also remove soil contaminated with non-VOCs from accessible areas to be protective of ongoing and future site uses. Restrictions on future land use, including residential, hospital, day care center and school uses, will be implemented for Cooper Drum with the understanding that excavation of all non-VOC contaminated soil beneath existing structures is deemed infeasible. Land use restrictions could be lifted if the contaminated soil beneath structures is removed or treated prior to future land development.

Cooper Drum is located in a dense urban land use setting of mixed residential, commercial, and industrial parcels. The surrounding land uses are anticipated to continue to be of mixed urban uses. The ongoing drum processing operations at Cooper Drum are considered to be a heavy industrial use for which the property is currently zoned. The City of South Gate Community Development Department is currently reevaluating land use designations and development options for the next 10 to 15 years. New zoning restrictions may be enacted to conform with any changes made to land use designations.

Future reasonably anticipated land use options for Cooper Drum include light industrial and high density commercial. Current drum processing operations could continue under a "grandfather rule" which allows for non-conforming status as long as operations are not expanded. Due to the proximity to the area where a regional high speed rail corridor may be built, it is also possible that future development for residential housing could be considered for Cooper Drum. Residential use could occur only after the selected remedy for soil is completed and residual non-VOC contamination above action levels is removed from beneath structures.

The contaminated groundwater under Cooper Drum is semi-confined in the upper aquifer and characterized as shallow groundwater of poor quality water (e.g. due to high background levels of arsenic, sulfate, chloride and total dissolved solids). Although the upper aquifer is not currently used as a drinking water source, Cooper Drum is located within a groundwater basin (the Central Basin) that is designated by the Water Quality Control Plan for the Los Angeles Region (the Basin Plan) as having beneficial uses for drinking water, agricultural, industrial processes, and industrial services. There are no other potential beneficial uses associated with groundwater in the upper aquifer underlying Cooper Drum. The potential for on-site residential land use, which includes groundwater at Cooper Drum being used as a drinking water source, is the most conservative scenario used as a basis for the reasonable exposure assessment assumptions and risk characterization conclusions that prompted the remedial action objectives for Cooper Drum. Once implemented, the selected remedy for groundwater will protect the existing beneficial uses of the currently uncontaminated deeper aquifers (starting with the Exposition Aquifer) and will remove VOC contamination above drinking water standards in the upper (shallow) aquifer.

Cleanup Levels for Soil and Groundwater

The cleanup levels for contaminated soil and groundwater for Cooper Drum are listed in Table 12-5.

Soil VOCs

The cleanup levels for VOCs in soil are to be determined (TBD) based on the remedial goal, which is to prevent the vertical migration of leachate at concentrations that would impact the shallow aquifer above drinking water standards (MCLs). To evaluate attainment of this goal, performance evaluation soil gas samples will be collected during remediation (soil vapor extraction). The sampling results will then be used in the VLEACH model to evaluate impact to groundwater. The soil gas sample analytical results will also be input into the Johnson & Ettinger Model (which estimates indoor air concentration) to ensure that residual VOC concentrations remaining in soil (after soil vapor extraction) are protective of potential indoor air receptors.

Soil Non-VOCs

The polycyclic aromatic hydrocarbon (PAH) cleanup level for soil is based on the upper tolerance limit (UTL) background Benzo(a)pyrene-toxicity equivalent (B(a)P-TE) concentration for the southern California PAH data set which is 900 μg/kg B(a)P-TE. The detected PAH concentrations in each confirmation sample will be multiplied by the applicable toxicity equivalency factors (TEF) and summed to generate a B(a)P-TE value. The B(a)P-Te will be calculated using TEF values recommended by DTSC (as noted in parentheses) for each of the following PAHs:

- Benzo(a) anthracene (0.1)
- Benzo(a)pyrene (1.0)
- Benzo(b) fluoranthene (0.1)
- Benzo(k) fluoranthene (0.1)
- Chrysene (0.01)
- Dibenz(a,h)anthracene (0.34)
- Indeno(1,2,3-cd) pyrene (0.1)

The PCB cleanup goal of 870 μg/kg for soil was back-calculated by applying the same residential exposure parameters used in the site HHRA for Cooper Drum (See Appendix L, Cooper Drum RI/FS Report, URS, 2002) and a target health risk level of 1 in 100,000 (1.0e-05).

The lead cleanup goal of 400 ppm is based on the Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK) for residential use.

Groundwater VOCs

The cleanup levels for VOCs in groundwater are the California primary drinking water standards (MCLs). Since no MCL has been established for 1,2,3-TCP, the practical quantitation limit (PQL) will be used.

Table 12-5
Cleanup Levels for Contaminants of Concern

Medium	Contaminant of Concern	Cleanup Level	Basis for Clean up Level	Risk at Cleanup Level
Soil (VOCs)	1,1-Dichloroethane (1,1-DCA)	Leachate <MCL[a]	VLEACH modeling	TBD
	1,1-Dichloroethene (1,1-DCE)	Leachate <MCL	VLEACH modeling	TBD
	1,2-Dichloroethane (1,2-DCA)	Leachate <MCL	VLEACH modeling	TBD
	1,2-Dichloropropane (1,2-DCP)	Leachate <MCL	VLEACH modeling	TBD
	1,2,3-Trichloropropane (1,2,3-TCP)	Leachate <PQL	VLEACH modeling	TBD
	Benzene	Leachate <MCL	VLEACH modeling	TBD
	cis-1,2-Dichloroethene (cis-1,2-DCE)	Leachate <MCL	VLEACH modeling	TBD
	trans-1,2-Dichloroethene (trans-1,2-DCE)	Leachate <MCL	VLEACH modeling	TBD
	Tetrachloroethene (PCE)	Leachate <MCL	VLEACH modeling	TBD
	Trichloroethene (TCE)	Leachate <MCL	VLEACH modeling	TBD
	Vinyl chloride	Leachate <MCL	VLEACH modeling	TBD
Soil (nonVOCs)	Aroclor-1254	870 μg/kg	Human health hazard	1 e-05
	Aroclor-1260	870 μg/kg	Human health hazard	1 e-05
	B (a)P-TE [b] - Benzo(a)anthracene - Benzo(a)pyrene - Benzo(b)fluoranthene - Benzo(k)fluoranthene - Chrysene - Dibenz(a,h)anthracene - Indeno(1,2,3-cd)pyrene	900 μg/kg	Background	Background
	Lead	400 mg/kg	Human health hazard	IEUBK Model
Groundwater (VOCs)	1,1-Dichloroethane (1,1-DCA)	5 μg/L	MCL	Cancer risk at 2.6e-06
	1,1-Dichloroethene (1,1-DCE)	6 μg/L	MCL	HI = 0.04
	1,2-Dichloroethane (1,2-DCA)	0.5 μg/L	MCL	Cancer risk at 4.0e-06
	1,2-Dichloropropane (1,2-DCP)	5 μg/L	MCL	Cancer risk at 3.1e-05
	1,2,3-Trichloropropane (1,2,3-TCP)	1 μg/L	PQL [c]	Cancer risk at 6.2e-04
	Benzene	1 μg/L	MCL	Cancer risk at 9.0e-06
	cis-1,2-Dichloroethene (cis-1,2-DCE)	6 μg/L	MCL	HI = 0.23
	trans-1,2-Dichloroethene (trans-1,2-DCE)	10 μg/L	MCL	HI = 0.19
	Tetrachloroethene (PCE)	5 μg/L	MCL	Cancer risk at 1.2e-05
	Trichloroethene (TCE)	5 μg/L	MCL	Cancer risk at 4.9e-06
	Vinyl chloride	0.5 μg/L	MCL	Cancer risk at 2.2e-05

μg/L micrograms per liter
μg/kg micrograms per kilogram
MCL California primary maximum contaminant level
PQL Practical quantification limit
TBD To be determined
IEUBK Model - Integrated Exposure Uptake Model for Lead in Children

[a] MCLs from Title 22 California Code of Regulation Section 64431 and 64444 unless otherwise specified.

[b] Based on upper tolerance limit (UTL) background Benzo(a)pyrene-toxicity equivalent (B(a)P-TE) concentration for southern California PAH data set.

[c] No MCL established for 1,2,3-trichloropropane. The PQL was identified as a remedial goal for 1,2,3-trichloropropane.

13.0 Statutory Determination

Under CERCLA §121 and the NCP, the lead agency must select remedies that are protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), are cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element and a bias against off-site disposal of untreated wastes.

13.1 Protection of the Human Health and the Environment

The selected remedy, soil Alternative 3, will protect human health and the environment through the treatment of VOC-contaminated soil by using an enhanced soil vapor extraction system (DPE treatment system) and excavation and off-site disposal of non-VOC contaminated soil. Treatment of VOC soil contaminants eliminates the potential for migration to groundwater and the threat of indirect on-site and off-site exposures via ingestion of contaminated groundwater. The selected remedy for VOCs in soil will reduce contamination so that the groundwater will meet the protective state and federal drinking water standards.

Removal of non-VOC contaminants in the soil eliminates the threat of exposure via ingestion and dermal contact by on-site human receptors. The cumulative excess carcinogenic risk from non-VOC exposure is estimated at 3.3e-04 with a non-carcinogenic HI of 3. The risks from non-VOC soil exposure will be reduced to within the EPA's target carcinogenic risk range of 10e-04 to 10e-06 and the noncarcinogenic risk (HI) to less than 1.0.

A pump-and-treat system enhanced with chemical in situ treatment will restore the contaminated aquifer for potential beneficial use as a drinking water source and prevent the existing plume from migration to deeper aquifers used as a regional drinking water source. Treatment of groundwater will eliminate the threat of exposure via ingestion and inhalation of contaminated water by on-site and off-site human receptors. The cumulative excess carcinogenic risk from exposure to groundwater contaminants is estimated at 3.3e-02 with an non-carcinogenic HI of 193. The selected remedy for groundwater will reduce contamination to meet the protective state and federal drinking water standards.

13.2 Compliance with Applicable or Relevant and Appropriate Requirements

Remedial actions selected under CERCLA must comply with ARARs under federal environmental laws or, where more stringent than the federal requirements, state environmental or facility siting laws. Where a State has been delegated authority to enforce a federal statute, such as RCRA, the delegated portions of the statute are considered to be a federal ARAR unless the state law is broader or more stringent than the federal law.

The ARARs are identified on a site-specific basis from information about site-specific chemicals, specific actions that are being considered, and specific site location features. There are three categories of ARARs: 1) chemical-specific requirements, 2) location-specific requirements, and 3) action specific requirements. Where there are no chemical-, location-, or action-specific ARARs, EPA may consider non-promulgated federal or state advisories and guidance as to-be-considered (TBC) criteria. Although consideration of a TBC criteria is not required, standards based on TBCs are legally enforceable as performance standards.

Chemical-specific ARARs are risk-based standards or methodologies that may be applied to site-specific conditions and result in the development of cleanup levels for the COCs at Cooper Drum.

Location-specific ARARs are restrictions placed on the chemical contaminant or the remedial activities based on a geographic or ecological features. Examples of features include wetlands, floodplains, sensitive ecosystems and seismic areas.

Action-specific ARARs are usually technology- or activity-based requirements. They are triggered by the particular remedial activities selected to accomplish a remedy.

A summary of ARARs and TBC criteria for the selected remedy are presented in Table 13-1.

Table 13-1
ARARs for Selected Remedy

Authority	Medium	Legal Authority	Status	Synopsis of Requirement	Actions to be Taken to Attain Requirement
CHEMICAL-SPECIFIC ARARs					
Federal Regulatory Authority	Groundwater	Federal Primary Drinking Water Standards 40 CFR Part 141	Relevant and appropriate	Federal drinking water standards protect the public from contaminants that may be found in drinking water. The groundwater underlying Cooper Drum is a potential source of drinking water.	The selected remedy will use federal MCLs, unless State MCLs are more stringent, as cleanup levels for VOCs in groundwater and to protect groundwater from soil contaminants.
State Regulatory Authority	Groundwater	California Primary Drinking Water Standards H&S Code §4010 et seq. 22 CCR §64431 and 64444	Relevant and appropriate	California drinking water standards protect public health from contaminants found in drinking water sources. The groundwater underlying Cooper Drum is a potential source of drinking water.	The selected remedy will use state MCLs more stringent than federal MCLs as cleanup levels for VOCs in groundwater and to protect groundwater from soil contaminants.
State Regulatory Authority	Groundwater	Basin Plan for Los Angeles Region California Water Code §13240 et seq.	Relevant and appropriate	Establishes beneficial uses of ground and surface waters, establishes water quality objectives, including narrative and numerical standards, establishes implementation plans to meet water quality objectives and protect beneficial uses, and incorporates statewide water quality control plans and policies. The WQOs for groundwater are based on the primary MCLs.	The selected remedy will use the most stringent state or federal MCLs as cleanup levels for VOCs in groundwater and to protect groundwater from soil contaminants.
State Regulatory Authority	Groundwater	SWRCB Resolution No. 92-49 Policy and Procedures for Investigation and Cleanup and Abatement of Discharges under California Water Code §13304 (amended 4\21\94) California Water Code §13307 23 CCR §2550.4	Relevant and appropriate	To protect groundwater, the resolution requires cleanup to either background water quality or the best water quality that is reasonable if background water quality cannot be restored. Non-background cleanup levels must be consistent with maximum benefit to the public, present and anticipated future beneficial uses, and conform to water quality control plans and policies.	Groundwater at Cooper Drum will be cleaned up to MCLs for VOCs or to attain the best water quality that is reasonable, e.g. 1 ppb for 1,2,3-TCP which is the chemical detection limit.

Table 13-1 ARARs for Selected Remedy					
Authority	**Medium**	**Legal Authority**	**Status**	**Synopsis of Requirement**	**Actions to be Taken to Attain Requirement**
LOCATION-SPECIFIC ARARS					
State Regulatory Authority	Soil and groundwater	Prohibition-Destruction of Bird Eggs and Nests Fish & Game Code §3503	Applicable	This law prohibits take, possession, or needless destruction of any bird nests and eggs, except as provided by the Fish and Game Code or regulations.	Project construction of the selected remedy will not result in a 'take' and will comply with this requirement.
State Regulatory Authority	Soil and groundwater	Non-Game Animals Fish & Game regulations 14 CCR §472	Applicable	Regulation provides that nongame birds and mammals may not be taken except for English sparrow, starling, coyote, weasels, skunks, opossum, moles, and rodents (excludes tree and flying squirrels, and those listed as furbearers, endangered, or threatened species); and American crows.	Project construction of the selected remedy will not result in a 'take' and will comply with this requirement.
ACTION-SPECIFIC ARARS					
Federal Regulatory Authority	Groundwater	NPDES Non-Point Source Discharge 40 CFR §122.26	Relevant and appropriate	Nonpoint sources address using best management practices for control of contaminants to stormwater run-off from construction activities on sites greater than 1 acre.	Since alternatives that evaluate soil excavation are confined to less than 1 acre, the requirement is not applicable but is relevant and appropriate. BMPs will be established to prevent stormwater run-off.
State Regulatory Authority	Groundwater	Basin Plan for Los Angeles Region Chapter 4 - Remediation of Pollution	Relevant and appropriate	The Basin Plan recognizes the cleanup goals based on the State's Antidegradation Policy as set forth in State Board Resolution No. 68-16. Under the Antidegradation Policy, whenever the existing quality of water is better than that needed to protect present and potential beneficial uses, such existing quality will be maintained.	Antidegradation requirements obligates EPA to prevent further degradation of the water during and at completion of the cleanup action for reinjection of treated groundwater to the aquifer and chemical injection to the aquifer to facilitate reductive dechlorination and oxidation. Any reinjection or chemical injection will be conducted in the plume to prevent further degradation where possible. The selected remedy will comply with the substantive RWQCB waste discharge requirements (WDRs) for chemical injection and reinjection.

Table 13-1 ARARs for Selected Remedy					
Authority	**Medium**	**Legal Authority**	**Status**	**Synopsis of Requirement**	**Actions to be Taken to Attain Requirement**
State Regulatory Authority	Groundwater	Water Quality Control Plan (Basin Plan) for Los Angeles Region (adopted 9\09\00) California Water Code §13240 et seq.	Relevant and appropriate	Presents numerical and narrative water quality objectives for maintaining a high quality of protection for the inland surface water and groundwater in the region. Groundwater underlying Cooper Drum has been identified by the Basin Plan as a potential drinking water aquifer.	Relevant to treated groundwater re-injection to the aquifer and soil cleanup to protect groundwater quality. Reinjection of treated VOC-contaminated groundwater will meet State and Federal MCLs. Soil VOC cleanup levels based on protection of groundwater quality for drinking water.
State Regulatory Authority	Groundwater	Non-Degradation Policy SWRCB Resolution No. 68-16 Water Code §13140	Applicable	Requires maintaining the existing water quality using best practicable treatment technology unless a demonstrated change will benefit the people of California, will not unreasonably affect present or potential uses, and will not result in water quality less than that prescribed in other state policies. Determination is made through a two-step process to determine (1) whether further degradation may be allowed, and (2) the discharge level which will result in the best practicable treatment or control of the discharge.	Antidegradation requirements will be addressed to prevent further degradation of the water during and at completion of the cleanup action. for reinjection of treated groundwater. Any reinjection or chemical injection will be conducted in the plume to prevent further degradation where possible. The selected remedy will comply with the substantive RWQCB WDRs for chemical injection and reinjection.
State Regulatory Authority	Soil	California Water Code §13140 - 13147, 13172, 13260, 13263, 132267, 13304 27 CCR Div.2, Subdiv.1, Chap.3, Subchap.2, Art.2	Applicable	Wastes classified as a threat to water quality (designated waste) may be discharged to a Class I hazardous waste or Class II designated waste management unit. Nonhazardous solid waste may be discharged to a Class I, II, or III waste management unit. Inert waste would not be required to be discharged into a SWRCB-classified waste management unit.	Waste will be classified for disposal to appropriate permitted off-site waste management units. CERCLA waste (e.g., contaminated soil, IDW, spent GAC) would be disposed at a off-site disposal facility.
State Regulatory Authority	Groundwater	Sources of Drinking Water SWRCB Resolution No. 88-63	Applicable	This policy specifies that ground and surface waters of the state are either existing or potential sources of municipal and domestic supply.	The requirement establishes groundwater underlying Cooper Drum as a potential source for drinking water. The selected remedy will apply a groundwater cleanup level protective of drinking water.

Table 13-1
ARARs for Selected Remedy

Authority	Medium	Legal Authority	Status	Synopsis of Requirement	Actions to be Taken to Attain Requirement
State Regulatory Authority	Soil and groundwater	Hazardous waste regulations Identification and Listing of Hazardous Waste 22 CCR Div. 4.5, Chap. 11 22 CCR §66264.13 22 CCR §66260.200	Applicable	A generator must determine if the waste is classified as a hazardous waste in accordance with the criteria provided in these requirements.	The selected remedy will comply with the waste classification requirements to determine proper disposal of waste. Waste characteristics of treated soil and groundwater will be defined prior to treatment and disposal.
State Regulatory Authority	Soil and groundwater	Hazardous waste regulations Standards Applicable to Generators of Hazardous Waste 22 CCR Div. 4.5, Chap. 12	Relevant and appropriate	Establishes waste storage timeframes on site. The purpose of the 90-day storage limit is to prevent creating a greater environmental hazard than already exists at Cooper Drum.	Waste contained on site will be maintained in a container in good conditions prior to off-site disposal.
State Regulatory Authority	Soil and groundwater	Hazardous waste regulations Hazardous Waste Security 22 CCR §66264.14	Relevant and appropriate	A treatment facility should maintain a fence in good repair which completely surrounds the active portion of the facility. A locked gate at the facility should restrict unauthorized personnel entrance. The security standards to prevent entry from unauthorized personnel for the proposed remedial treatment alternatives should be applied.	The selected remedy will comply with the security requirements around the treatment plant.

Table 13-1 ARARs for Selected Remedy					
Authority	**Medium**	**Legal Authority**	**Status**	**Synopsis of Requirement**	**Actions to be Taken to Attain Requirement**
State Regulatory Authority	Soil and groundwater	Hazardous waste regulations Hazardous Waste Facility General Inspection Requirements and Personnel Training 22 CCR §66264.15 - 66264.16	Relevant and appropriate	The hazardous waste facility standards require routine facility inspections conducted by trained hazardous waste facility personnel. Inspections are to be conducted at a frequency to detect malfunctions and deterioration, operator errors, and discharges which may be causing or leading to a hazardous waste release and a threat to human health or the environment.	The treatment system will comply with this requirement and provide treatment system inspections for malfunctions and deterioration.
State Regulatory Authority	Soil and groundwater	Hazardous waste regulations Preparedness and Prevention 22 CCR Div. 4.5, Chap. 14, Art. 3	Relevant and appropriate	Facility design and operation to minimize potential fire, explosion, or unauthorized release of hazardous waste.	The selected remedy will comply with the design requirements.
State Regulatory Authority	Groundwater	Hazardous waste regulations Water Quality Monitoring and Response Systems for Permitted Systems 22 CCR Div. 4.5, Chap. 14, Art. 6	Relevant and appropriate	The requirements present the groundwater monitoring system objectives and standards to evaluate the effectiveness of the corrective action program (remedial activities). After completion of the remedial activities and closure of the facility, groundwater monitoring will continue for an additional three years to ensure attainment of the remedial action objectives.	The selected remedy will comply with these requirements by monitoring to demonstrate all the COCs concentrations are reduced to levels below cleanup levels.
State Regulatory Authority	Soil and groundwater	Hazardous waste regulations Closure and Post-Closure 22 CCR Div. 4.5, Chap. 14, Art. 7	Relevant and appropriate	The closure and post-closure requirements establish standards to minimize maintenance after facility closure to protect human health and the environment. The closure and post-closure requirements may be dependent upon the treatment alternatives.	The selected remedy will comply with these requirements. Specific closure conditions of the treatment facilities will be provided in a site closure report after completion of the remedial action.

Table 13-1
ARARs for Selected Remedy

Authority	Medium	Legal Authority	Status	Synopsis of Requirement	Actions to be Taken to Attain Requirement
State Regulatory Authority	Soil and groundwater	Hazardous waste regulations Use and Management of Containers 22 CCR Div. 4.5, Chap. 14, Art. 9	Relevant and appropriate	Maintain container and dispose to a Class I hazardous waste disposal facility within 90 days. The 90-day storage limit prevents greater environmental hazard than already exists. Maintaining the containers in good conditions at all times and not creating an environmental hazard is relevant and appropriate.	Storage of investigation-derived waste (i.e., soil cuttings from well development) will occur. Requirements may apply for the storage of contaminated groundwater and sediments trapped by the bag filter during start-up operation. Waste contained on site will be maintained in a container in good condition prior to off-site disposal.
State Regulatory Authority	Groundwater	Hazardous waste regulations Tank Systems 22 CCR Div. 4.5, Chap. 14, Art. 10	Relevant and appropriate	Minimum design standards (i.e., shell strength, foundation, structural support, pressure controls, seismic considerations) for tank and ancillary equipment are established. The requirements for minimum shell thickness and pressure controls to prevent collapse or rupture prevents a greater environmental hazard than already exists.	The selected remedy will comply and treatment system design requirements not to create an environmental hazard greater than already exists.
State Regulatory Authority	Soil and groundwater	Hazardous waste regulations Miscellaneous Units 22 CCR Div. 4.5, Chap. 14, Art. 16 22 CCR §66264.601 - 66264.603	Relevant and appropriate	Minimum performance standards are established for miscellaneous equipment to protect health and the environment. "Miscellaneous unit" are units that are not a container, tank, surface impoundment, pile, land treatment unit, landfill, incinerator, boiler, industrial furnace other than industrial furnaces (i.e., injection wells, treatment system).	None of the COCs are classified as hazardous waste. The selected remedy will comply with those environmental performance standards to protect human health and the environment in the treatment system design and construction.
State Regulatory Authority	Air	South Coast Air Quality Management District (SCAQMD) Rules and Regulations Regulation IV, Rule 402, Nuisance.	Applicable	A person shall not discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public or which endanger the comfort, repose, health, or safety of any such persons or the public or which cause to have a natural tendency to cause injury or damage to business or property.	The selected remedy will provide short- and long-term emission control measures during construction and O&M to prevent impacts to the public.

Table 13-1
ARARs for Selected Remedy

Authority	Medium	Legal Authority	Status	Synopsis of Requirement	Actions to be Taken to Attain Requirement
State Regulatory Authority	Air	South Coast Air Quality Management District (SCAQMD) Rules and Regulations Regulation IV, Rule 403, Fugitive Dust	Applicable	Emissions of fugitive dust shall not remain visible in the atmosphere beyond the property line of the emission source. Activities conducted in the South Coast Air Basin shall use best available control measures to minimize fugitive dust emissions and take necessary steps to prevent the track-out of bulk material onto public paved roadways as a result of their operations.	The selected remedy will provide short- and long-term fugitive emission control measures during construction and O&M to prevent impacts to the public
State Regulatory Authority	Air	South Coast Air Quality Management District (SCAQMD) Rules and Regulations Regulation IV, Rule 404, Particulate Matter – Concentration.	Applicable	Particulate matter in excess of the concentration standard conditions shall not be discharged from any source. Particulate matter in excess of 450 milligrams per cubic meter (0.196 grain per cubic foot) in discharged gas, calculated as dry gas at standard conditions, shall not be discharged to the atmosphere from any source.	The selected remedy will provide emission control measures during construction and O&M to comply with these emission standards.
State Regulatory Authority	Air	South Coast Air Quality Management District (SCAQMD) Rules and Regulations Regulation IV, Rule 405, Solid Particulate Matter – Weight.	Applicable	Solid particulate matter including lead and lead compounds discharged into the atmosphere from any source shall not exceed the rates Table 450(a) of Rule 405. Nor shall solid particulate matter including lead and lead compounds in excess of 0.23 kilogram (0.5 pound) per 907 kilograms (2,000 pounds) of process weight be discharged to the atmosphere. Emissions shall be averaged over one complete cycle of operation or one hour, whichever is the lesser time period.	The selected remedy will provide emission control measures during excavation of lead contaminated soil to comply with these emission standards.

Table 13-1 ARARs for Selected Remedy					
Authority	**Medium**	**Legal Authority**	**Status**	**Synopsis of Requirement**	**Actions to be Taken to Attain Requirement**
State Regulatory Authority	Air	South Coast Air Quality Management District (SCAQMD) Rules and Regulations Regulation XIII, Rule 1303 - New Source Review	Applicable	Construction for any relocation or for any new or modified source which results in an emission increase of any nonattainment air contaminant, any ozone-depleting compound, or ammonia, must include BACT for the new or relocated source or for the actual modification to an existing source. This requirement would apply to treatment technologies with potential to emit primary pollutant(s) to the atmosphere.	The selected remedy will be designed and constructed with BACT emission control measures on the treatment system to comply with these emission standards.
State Regulatory Authority	Air	South Coast Air Quality Management District (SCAQMD) Rules and Regulations Regulation XIV, Rule 1401, New Source of Toxic Air Contaminants.	Applicable	Construction or reconstruction of a major stationary source emitting hazardous air pollutants shall be constructed with Best Available Control Technology for Toxics (T-BACT) and complies with all other applicable requirements.	The selected remedy will be designed and constructed to comply with T-BACT emission standards.
TO-BE-CONSIDERED CRITERIA					
TBC	Soil and groundwater	California Well Standards California Department of Water Resources Bulletin 74-90	To-be-considered	Provides minimum specifications for monitoring wells, extractions wells, injection wells, and exploratory borings. Design and construction specifications are considered for construction and destruction of wells and borings.	Extraction and injection well siting requirements are inappropriate for Cooper Drum because the effectiveness of the remedy is dependent upon well locations. Wells constructed for the selected remedy (e.g., extraction wells, injection wells, monitoring well, soil vapor wells) will be constructed to meet the minimum state standards.

13.3 Cost Effectiveness

In EPA's judgement, the selected remedies for soil and groundwater are cost-effective and present reasonable value. According to the NCP, a remedy is cost-effective if its costs are proportional to its overall effectiveness. The overall effectiveness of the selected remedies for soil and groundwater was demonstrated in the comparative analysis of the alternatives. The selected remedies satisfy the threshold criteria (overall protectiveness and compliance with ARARs), while scoring highly with respect to the three balancing criteria of long-term effectiveness, reduction in toxicity, mobility, and volume through treatment, and short-term effectiveness.

The overall effectiveness of the alternatives was then evaluated with respect to the respective cost estimates. Because the selected remedies for soil and groundwater provide effective and permanent solutions in a relatively short time-frame, the overall cost of implementation may be higher or lower relative to less effective alternatives.

The selected remedy for soil (Alternative 3) includes an excavation component for removal of non-VOCs in accessible areas. This is in addition to use of institutional controls which is also included in soil Alternative 2. Excavation and off-site disposal of contaminated soil reduces the volume of contamination and provides an effective and permanent remedy in a short time-frame. Implementation of institutional controls alone does not reduce the volume of contamination. Therefore, in EPA's judgement, the added cost of excavation is justified in order to effectively satisfy the threshold and balancing CERCLA criteria.

The selected remedy for groundwater (Alternative 4) includes possible use of an in situ technology combined with extraction and treatment. It is expected that use of in situ oxidation and/or reductive dechlorination will enhance destruction of VOCs in the aquifer over the short-term. When compared to use of pump-and-treat alone, addition of in situ treatment may actually result in cost savings because of the expected reduction in time, as well as the lower amount/intensity of extraction and treatment required to reach remedial action goals. For cost estimating purposes, however, no reduction in remedial action time or effort was assumed. This led to higher projected capital costs for the selected remedy as compared to pump-and-treat alone (Alternative 2). Because of the reduced extraction volume, the projected annual O&M costs were actually lower for the selected remedy. Provided the results of planned pilot-scale tests are positive, the EPA believes that use of an in situ technology in addition to pump-and-treat is more cost-effective than use of stand-alone pump-and-treat, or conversely, use of stand-alone in situ treatment (as in Alternative 6).

13.4 Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

The EPA believes that the selected remedies for soil and groundwater represent the maximum extent to which permanent and alternative solutions can be used in a practical manner at Cooper Drum. As shown in Table 10-1, the selected remedies for soil and groundwater satisfy the threshold criteria of overall protection and compliance with ARARs, while scoring competitively with respect to the five balancing CERCLA criteria. An evaluation of the selected remedies with respect to the balancing and modifying criteria follows.

Selected Remedy for Soil (Alternative 3)

Long-term Effectiveness and Permanence: The selected remedy includes the use of dual phase extraction (DPE), an enhancement of soil vapor extraction (SVE), which is the presumptive remedy for VOCs in soil. With respect to non-VOCs, the selected remedy combines the use of excavation in accessible areas, and institutional controls in non-accessible soil areas. In comparison, Alternative 2 relies only on institutional controls.

Reduction of Toxicity, Mobility, or Volume Through Treatment: Use of extraction/DPE will permanently and effectively reduce the volume of VOC contamination in soil. Because of the mix of non-VOC contaminants, use of individual treatment methods for each component is not feasible. Excavation and off-site disposal of contaminated soil will reduce the volume of contamination in accessible soil areas. Institutional controls alone, as in Alternative 2, would only reduce mobility of non-VOCs so long as the pavement is maintained.

Short-term Effectiveness: The extraction/DPE action is expected to be completed within two years. Compared to Alternative 2, excavation and disposal of contaminated soil is expected to expedite short-term effectiveness. Appropriate health and safety measures must be adhered to during the remedial action.

Implementability: The selected remedy is technically feasible and implementable. All material and equipment is commercially available. Implementation of institutional controls will require the cooperation of the state (DTSC) and/or local government. The excavation component of the selected remedy will be readily implementable, except beneath existing structures.

Costs: The selected remedy is cost-effective.

State Acceptance: The DTSC and RWQCB have accepted the selected remedy.

Community Acceptance: The community has accepted the selected remedy.

Selected Remedy for Groundwater (Alternative 4)

Long-term Effectiveness and Permanence: The selected remedy is expected to be highly effective and permanent because it combines the use of a proven and effective ex situ technology (extraction/GAC treatment) with the use of an alternative in situ technology (chemical oxidation and/or reductive dechlorination). Pilot-scale tests are planned to ensure the effectiveness of, and aid in the design of, the in situ response action prior to full-scale implementation.

Reduction of Toxicity, Mobility, or Volume Through Treatment: The volume of contamination will be reduced through active treatment. The combination of treatments is expected to be more effective than use of either ex situ or in situ treatment alone.

Short-term Effectiveness: By including an in situ treatment component, the EPA expects to expedite the completion of remedial action. Use of lower extraction rates will reduce the potential for commingling with off-site plumes but will be sufficient for plume containment. Lower VOC concentrations may be observed shortly after in situ treatment. Appropriate health and safety measures must be adhered to during the remedial action, especially when handling any oxidizing agents.

Implementability: The selected remedy is technically feasible and implementable. All material and equipment is commercially available. The EPA believes that the added implementation effort associated with in situ treatment is justified in view of the possible cost savings and increased effectiveness over the short and long term.

Costs: The selected remedy is cost-effective. The added capital cost of in situ treatment is expected to be compensated by lower annual O&M costs and shorter duration of remedial action.

State Acceptance: The DTSC and RWQCB have accepted the selected remedy.

Community Acceptance: The community has accepted the selected remedy.

13.5 Preference for Treatment as a Principal Element

There is no source material(s) posing a principal threat at Cooper Drum and EPA's statutory preference for treatment of principal threats does not apply to this site (NCP §300.430(a)(1)(iii)(A)).

However, this remedy satisfies the statutory preference for treatment as a principal element of the remedy (i.e., reduces the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants as a principal element through treatment) (NCP §300.430(f)(5)(ii)(F)). Treatment is a major component of the selected remedy for soil and groundwater. The VOC soil contaminants are a potential threat to groundwater and will be treated using DPE technology. A relatively low concentration groundwater contaminant plume will use a pump-and-treat system using GAC and chemical in situ treatment.

13.6 Five-Year Review Requirements

Because this remedy may result in hazardous substances, pollutants, or contaminants remaining on site above levels that allow for unlimited use and unrestricted exposure, and will take longer than five years to attain RAOs and cleanup levels, a policy review will be conducted within five years of construction completion for Cooper Drum to ensure that the remedy is, or will be, protective of human health and the environment.

14.0 Documentation of Significant Changes

The Proposed Plan for Cooper Drum was released for public comment in June 2002. The Proposed Plan identified soil Alternative 3 - dual phase extraction and treatment, institutional control, and excavation as the Preferred Alternative for soil remediation. Groundwater Alternative 4 - extraction and treatment with in situ chemical treatment consisting of reductive dechlorination and chemical oxidation was identified as the Preferred Alternative for groundwater remediation. EPA reviewed all written and verbal comments submitted during the public comment period. It was determined that no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate.

PART III RESPONSIVENESS SUMMARY

1.0 Stakeholder Issues and EPA Responses

After review of the Cooper Drum RI/FS Report (URS, 2002b), the DTSC raised concern regarding data gaps which have not been sufficiently defined: 1) the lateral and vertical extent of VOCs in the vadose zone beneath the drum processing building; 2) the lateral and vertical extent of non-VOCs (PCBs, PAHs, Dieldrin, and Lead) in the soil beneath the HWA and DPA; and 3) the lateral and vertical extent of VOCs in the downgradient area (beyond the Cooper Drum boundary) of the groundwater plume. The DTSC has agreed to the selected soil and groundwater remedies providing additional data is collected to address its concerns prior to implementation of the selected remedy.

During the public comment period for the Proposed Plan, no written comments were received. Questions that were raised at the Public Meeting were addressed by EPA staff. There were no significant issues or objections directed toward the selected remedy. EPA believes that the selected remedy addresses the community concerns that were identified during community interviews. The main concern was that the selected remedy should not include incineration of contaminants, which could further impact air quality conditions. The selected remedies for soil and groundwater do not include incineration of contaminants and will not adversely impact air quality; therefore, community concerns have been addressed.

2.0 Technical and Legal Issues

2.1 Technical Issues

The EPA has included the following components in the selected soil and groundwater remedy to address the DTSC concerns.

Conduct additional soil gas sampling in the drum processing area (DPA) during the remedial design (RD) phase to further identify the extent of VOC contamination and the need for remediation using dual phase extraction in this area.

Conduct additional soil sampling in the DPA and HWA during the RD phase to further define the extent of non-VOC contamination and the need for remediation beyond the estimated 2,700 tons of soil.

Conduct additional groundwater sampling during the RD phase to further define the downgradient extent of the VOC contamination (beyond the property boundary).

2.2 Legal Issues

None identified.